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AUTHOR Galvin, Patrick F.; Bruce, Robert

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ABSTRACT

In 1985-86 several small school districts in rural New York State began cooperating to offer advanced high school courses via audio-graphic telecommunications. Evaluation of the Tele-Learning project's second year used a case study approach to examine four diverse programs: advanced placement English, advanced placement calculus, Spanish III, and the Electronic Field Trip. For each course, a single teacher simultaneously taught students in several schools using telecommunications equipment (telephone, modem, computer, software, and electronic notepad). Electronic Field Trips were telephone conferencing interviews with people of interest to students. The case studies demonstrated that audio-graphic technology could be a successful way of teaching very different subject materials. Most students and teachers agreed that the equipment worked well and was easy to use. The organization of the "classroom" (several remote locations) did not interfere with learning and allowed these somewhat isolated students to become familiar with the differences and similarities of students in other schools. The future of Tele-Learning programs may depend more on administrative issues than on the technical capabilities of audio-graphics. Such administrative issues included teacher resistance due to the loss of the "best" students from regular classes and differences between schools in scheduling, achievement standards, and extent of student preparation for advanced courses. (SV)

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TECHNOLOGY AND RURAL EDUCATION: THE CASE OF AUDIO-GRAPHIC TELECOMMUNICATIONS

BY:
PATRICK F. GALVIN
DR. ROBERT BRUCE
CORNELL UNIVERSITY
ITHACA, N.Y.
JUNE, 1987

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We wish to thank all the students, teachers, school administrators and BOCES personnel for their willing cooperation in this project. This report could not have been developed without their support. Professor Greene at Cornell University deserve recognition for her support and encouragement in this type of inquiry. We want to express regret to those students and school officials with whom we were not able to meet and interview. The constraints of time, resources and personal energy limited the number of interviews we could conduct. And finally, while all aforementioned persons contributed to this report, the views we express in it are our own for which we assume responsibility.

Patrick Galvin
Dr. Robert Bruce
Cornell University
Ithaca, NY
June, 1987

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The organization of the written report is designed so that any of the stories or analyses can be read individually. The idea here is that the report should reach a varied audience with different interests and concerns. For example, a student considering a Tele-Learning AP Calculus course might read the story AP Calculus: The Story to get a sense of how such a course operates. Each story is designed to give the reader a sense of the experience of taking such a course via Tele-Learning. A teacher or school board member may want to read the analysis of a story to gain perspective about participation in such programs. In each case, we have tried to provide the reader with relevant and useful information so that the individual can draw their own conclusions about the value of such programs according to their own circumstances and criteria.

EVALUATION FINDINGS

Highlights of the evaluation findings include the following:

* The audio-graphics technology was used successfully by both teachers and students. Further, the technology worked successfully teaching very different subject materials. This was a surprise because we expected complicated subject material such as AP English, AP Calculus and Spanish to be difficult to teach over this medium.

* Most students and teachers interviewed agreed that the Optel audio-graphic equipment worked very well and was easy to use. There were some technical problems, especially when first setting up the equipment, but most of these were resolved without difficulty. Perhaps the biggest problem with the Optel computer software is the legibility of the handwritten graphics when using the electronic note pad.

* Sound transmission, which is carried by local telephone wires between classrooms in different schools, was at times not clear enough for students and teachers to communicate easily. Additionally the transmission of information between schools using a modem was slow and limited the potential of using the Optel graphics for instructional purposes. These problems did not significantly interfere with any of the four Tele-Learning programs, however, despite the requirement for considerable communication.

* Many of the students and teachers expressed a desire for visual contact during their Tele-Learning courses, but it remained unclear exactly what problems would be resolved with audio-visual, or what benefits would be gained from the technology. Audio-graphics demonstrated itself as an adequate instructional technology in these Tele-Learning programs.

* The students reported that the organization and operation of a Tele-Learning classroom did not interfere significantly with their learning. Indeed, one of the benefits of the Tele-Learning classroom is how it forces students to recognize the differences and similarities of students from other schools. Further, the value of these programs are not limited to the most able students, several programs included students with varying ability all of whom worked together successfully.

* The teachers who taught these courses reported some initial problems adjusting their teaching style to the Tele-Learning Optel audio-graphic classroom, but all were enthusiastic about the program's potential and expressed willingness to teach another Tele-Learning course.

* School administrators reported satisfaction with the Tele-Learning course. School district superintendents and school principals observed that the program did not complicate their administrative duties. School guidance counselors reported that scheduling differences between participating school districts were not always easily resolved and could lead to complications if a large number of Tele-Learning courses were offered.

* The role of the BOCES was described as important for the purpose of organizing the Tele-Learning programs, maintaining equipment, providing training for teachers and facilitating communication between interested participants.

PROGRAM RECOMMENDATIONS

The following recommendations reflect the ideas and comments of the many participants interviewed during this evaluation. While the case studies attempt to provide a full description of the varied concerns and comments about the programs, the recommendations here address the two evaluation questions:

1) The Delaware-Chenango BOCES should continue using the Optel audio-graphic telecommunication equipment in its Tele-Learning programs. The technology enables teachers and students to function successfully in the classroom, and while there is widespread interest in expanding the equipment to include a visual component to the service, it is not obvious what would be gained instructionally.

2) The Delaware-Chenango BOCES Tele-Learning program did offer students important educational opportunities which would not have otherwise been available to them. The findings of this evaluation suggests that school administrators should continue to offer these curricular

offerings, expanding them to include opportunities such as the astronomy course offered in 1986. Care should be taken, however, about selecting opportunities appropriate for students and not in conflict with existing programs within the school. Currently, the range of offerings is determined by a combination of student interest and teacher willingness to organize the courses. Such arrangements are likely to lead to uncontrolled expansion and organizational confusion. Further, educational planners may want to be more sensitive to equity and efficiency issues than these arrangements allow.

Tele-Learning has, in these case studies, demonstrated its potential to function as a successful educational program. The future success of the program will depend largely on the thoughtful willingness of the participants to overcome the technical as well as social problems that are inevitable. The stories and analyses included in this report will, hopefully, provide those decision-makers with the necessary information to become thoughtfully involved.

THE EVALUATION RATIONALE:
TELE-LEARNING PROJECT

JUNE, 1987

THE PROBLEM STATEMENT

Educational opportunities in the rural and smaller school districts of New York State are comparably fewer than those available in the larger districts of the state. One strategy for expanding such opportunities in these smaller districts (e.g. offering advanced curricular courses) has been through the use of Tele-Learning projects, often referred to as "distance learning".

Since January of 1986, students in the Delaware-Chenango BOCES District of New York have been involved in a number of Tele-Learning programs: AP English, AP Calculus, Spanish III, and a special program called The Electronic Field Trip. In the spring of 1987, the BOCES District Superintendent, Dr. Freeman Van Wickler, called for an evaluation of these programs. The following section of this report introduces the basic evaluation design and rationale for its organization which took place during the months of March to June, 1987.

THE AUDIENCE

The administrators of the Delaware-Chenango BOCES have identified three categories of audiences potentially interested in this evaluation report. First identified is the general public, due to their vested interests as taxpayers. Second, teachers and other professionals are assumed to be concerned about educational issues, such as planning time and student benefits. The third interested group is comprised of BOCES personnel and other school administrators with specific administrative concerns, such as understanding when and where the program is best utilized.

To accommodate these varied needs, a naturalistic case study approach was used for this evaluation. Another reason for using a case study approach was that relatively little is known about Tele-Learning instruction, and it was not possible to choose one or two well-tested variables on which to base a quantitative study. Nor was this program implemented in a systematic way that would lend itself to a quantitative study. Indeed, the conditions at each of the Tele-Learning sites were so unique that each required its own story.

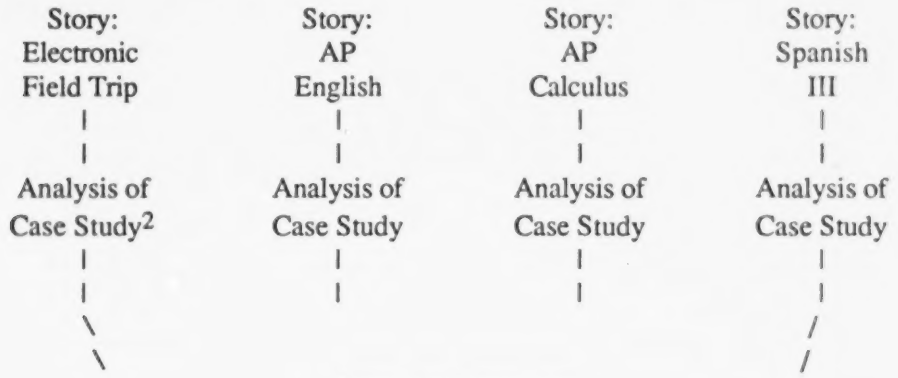
THE FORMAT OF THE RESULTS

The format of the report has been organized into three sections. In the first section, the four Tele-Learning programs are described in detailed case studies. The purpose of these descriptions is to give the reader a sense of the experiences of Tele-Learning for the participants (students, teachers and school administrators).

The second section of the evaluation involves an analysis of each of the four case studies. These analyses identify the emergent issues and concerns of the participants. Where the descriptive case studies are probably appropriate for all intended audiences, the analyses are more likely appropriate for professional educators interested in specific Tele-Learning programs.

The third and final tier of the evaluation will attempt to summarize and generalize from the experiences and concerns of all four case studies, where conclusions and recommendations will be discussed. This section of the report is probably most appropriate for school administrators and BOCES personnel concerned with improving and possibly expanding the program.

The report can be schematically summarized as follows:



THE EVALUATION QUESTIONS AND METHODS

When the Delaware-Chenango BOCES initiated the Tele-Learning program, school officials asked two evaluative questions:

1) Does the audio-graphic telecommunications equipment work well enough to enable teachers and students to function successfully in the classroom?
2) Does the Tele-Learning program offer students educational opportunities which significantly add to their learning at school?

These are complicated issues, and no single answer is likely to hold up against the varied needs and concerns of the many different participants. For example, the criteria defining a successful classroom may vary significantly from administrator to administrator, as well as from teacher to student. Given the uncertainty of exactly how to measure the success of these pilot programs it is important to consider these many perspectives. Naturalistic Inquiry[3] (an evaluation or research methodology) is organized to recognize multiple perspectives about such a problem. In this respect, the concerns of the BOCES personnel, as well as the concerns of the other participants (students, teachers, school administrators) were developed and discussed in this evaluation.

Recognizing multiple perspectives does not mean Naturalistic evaluations are without focus. In

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2 The analysis of the Electronic Field Trip differs slightly in organization from the other cases because of its unique character.

3 Guba, Egon & Yvonna Lincoln. Effective Evaluation. San Francisco: Jossey-Bass publishers, 1981.

this evaluation the questions of the BOCES administrators are the primary focus. Many of the specific criteria for addressing these questions, however, emerged from the interviews with students, teachers and administrators. In this respect, no one point of view became dominant in the evaluation report. Two methods were used to organize these many different perspectives: content analysis of the interviews, and a matrix comparing the concerns of participants among the four different Tele-Learning sites. The outline of the content analysis is provided in the appendix. The following questions, derived from these analyses, help illustrate the criteria used to draw conclusions about the Tele-Learning program.

CRITERIA FOR JUDGING QUESTION ONE

Question one, introduced above, is about the technical feasibility of teaching Tele-Learning courses using the audio-graphics technology. This evaluation focuses on several basic questions:

1) Did the equipment function properly or did technical problems inhibit successful implementation of the program?
2) Was the technology adequate: could students understand one another's voice?
3) Was the technology appropriate: could the teachers explain the concepts and could students ask questions using the Tele-Learning equipment?

The technical issues related to Tele-Learning are not limited to equipment, but include also the technical skills of teaching. The following questions address those issues:

4) Were the teachers able to establish a rapport with the students?
5) Did the teachers demonstrate a knowledge of student issues and concerns?
6) Were teachers able to assign homework, correct it and pass it back successfully?

A third set of criteria for considering the technical feasibility of the Tele-Learning programs involves scheduling issues:

7) Were the participating schools able to easily schedule the AP Calculus course, or were there serious scheduling problems?
8) Were students able to schedule the AP Calculus course, or did their participation in other activities interfere with their participation in this Tele-Learning program?

This outline identified three categories of "technical" issues: equipment, classroom management, and scheduling. Each of these technical issues contributes to an assessment of the feasibility of Tele-Learning as a viable instructional program.

CRITERIA FOR JUDGING QUESTION TWO

Question two is concerned with whether the Tele-Learning programs add significantly to

students' educational opportunities. In other words, are the courses really unique opportunities for students and are students able to learn from them? This is a difficult if not impossible question to answer directly. Student achievement, for example, is obviously an important measure for evaluating the success of any program, but limiting the evaluation to only academic issues may be misleading since there may be many other benefits of such programs. Further, poor student achievement may have more to do with how the program was implemented than the design of the program itself. If this were true then one could conclude that the program was not worthwhile when in fact it may be a very good program. This is an error that needed to be avoided, consequently several measures were used to make judgements about the viability of Tele-Learning programs.

The following questions consider the many characteristics of classroom experience and were used to assess evaluation question two:

1) Were students generally satisfied with their Tele-Learning course?
2) Were the students adequately prepared for the course?
3) Did the students attend class and hand in homework?
4) Did the students who began the AP program finish it?
5) Did the students take the AP Exam?

The selection of these questions as criteria for judging the merit and worth of the Tele-Learning programs is not meant to exclude other questions from consideration. Quite the contrary, these questions are intended to assist school officials considering such a program to formulate their own criteria. Our concern is that school officials do not decide to abandon a successful program, or retain an unsuccessful program, for want of considering the full range of significant criteria in judging the program. These criteria provide the framework for making judgements about the Tele-Learning projects organized in the Delaware-Chenango BOCES, 1987.

TRUSTWORTHINESS OF THE DATA AND RESULTS

Every study needs to be concerned about the validity of its results. In other words, how can the reader of this evaluation report know that the evaluator's sources for information fairly represent the issues and concerns of the participants for each case study? How does the reader know that the evaluators' biases have not distorted the opinions and values of the participants' interview?[4]

The Naturalistic Inquiry approach encourages checks of the trustworthiness of data collected. In this evaluation a sampling strategy was employed to ensure a variety of participants were interviewed. Consequently, BOCES administrators were interviewed as were school administrators, teachers and students. Using a purposive sampling strategy allowed for comparisons among the participants' views. In this way the sampling strategy ensured that no single view dominated the data collected.

It is important to note, however, that non-participants in this project were not interviewed.

4 For more on the validity of Naturalistic Inquiry see Guba & Lincoln., 1981, pp85 - 127.

There are two reasons for this decision. First, the purpose of this evaluation was to understand the experiences and values of those who had participated in the program. Second, resources and time were not sufficient to carry out the more extensive investigation of why students and school officials choose not participate in the programs. Since these programs were pilots, the purpose of the evaluation was to intensely study those sites where the programs were in operation.

Another check of the trustworthiness of the data was done by collecting similar data using different methods. Several methods were used: group interviews, observations, use of existing documents, grade sheets, student's written work and personal letters. These varied perspectives helped ensure the reliability of the data collected and hence the trustworthiness of the results.

These sampling strategies and evaluation methods provide a strong argument for the credibility of the data. Each allows for a different picture of the same events. To a large extent the results of data collection were consistent between methods. As a final check of the trustworthiness of the results, a copy of the stories written were sent to the participating students and teachers. The reaction by most all the participants was favorable with minor additions and corrections.

EVALUATION DATA ANALYSIS

A second concern about the validity or credibility of the results involves the analysis of the data: how does the reader know that the analysis represents the concerns and issues of the participants? Consistent with the Naturalistic Inquiry approach, the data analysis in this evaluation was emergent in nature. In other words, transcripts of each interview and each observation were analyzed sentence by sentence. Each sentence was subsequently categorized into a taxonomy which reflected the participants' concerns. This procedure assures that the issues and views of each individual were identified and considered in the analysis.[5] The analysis of each case thus includes the interests of the participants structured within the specific questions of the BOCES administrators who requested the evaluation.

EXTERNAL VALIDITY

These procedures described above (sampling procedures, multiple methods, and collaborative studies) help assure the reader that the evaluators have gained a "true" picture of the Tele-Learning program, which substantiate the judgments about the program. These judgments address the first part of the evaluation question (the program's merit and worth), but what can be said about the issue of generalizing the results beyond the circumstances of the case studies?

Experimental evaluations or "scientific evaluations" attempt to address this question through the use of random sampling techniques, including a control group. The Naturalistic Inquiry method approaches the problem differently, relying on purposive sampling.

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5 For more on the topic of content analysis, see Miles, Matthew B. & Huberman, A. Michael. Qualitative Data Analysis. Beverly Hills, CA: Sage Publication, 1986.

In this evaluation four sites, each very different from the other, have been carefully evaluated. In each of these sites similar equipment and classroom management issues were encountered by a variety of teachers and students in varying circumstances. We propose that if the Tele-Learning equipment works for student and teachers in each of these sites then, it will likely work for other teachers in similar situations. Further, if all the Tele-Learning programs.work in these varying circumstances then it is reasonable to conclude that the programs are flexible enough to work in varying circumstances. Finally, if problems are consistently found across all four Tele-Learning programs then the likelihood of other school districts and participants encountering similar problems is thought to be high. These propositions were used as criteria for concluding external validity.

CONCLUSIONS

In the preceding section the method and rationale were outlined for evaluating the Tele-Learning Project in the Delaware-Chenango BOCES of New York State. The purpose of the rationale has been to substantiate the trustworthiness (validity and reliability) of the data and hence the conclusions of the evaluation. The claim that results are trustworthy is based first on careful use of methods to collect data which was then used to write case studies (internal validity). Careful attention to a sampling strategy as well as the use of multiple methods for collecting data helped substantiate the argument for reliability and validity. Further, several checks of the data were conducted during the evaluation to assess their trustworthiness. Many of these checks were informal conversations with students and school officials. Other checks were more formal, for example, students reading and commenting on our case studies and questionnaires. Hence we conclude that our data fairly represents the concerns and issues of the participants.

AP ENGLISH:
THE STORY

JUNE, 1987

For many students in more rural areas of New York State, courses such as Advanced Placement English are often unavailable. School officials in the Delaware-Chenango BOCES are attempting to remedy the problem through a special Tele-Learning project which makes use of interactive audio-graphic telecommunications technology. Although the project utilizes computer technology, the communication system is as familiar as the telephone. For the fifteen students in both South Otselic Central and Oxford Central Academy High School, the result is an important educational opportunity: AP English.

The Tele-Learning project provides a means by which a teacher can simultaneously teach students in more than one school. Michael Foor-Pessin, the teacher at South Otselic Central High School who taught the Advanced Placement English course, had invited me to his class to observe how Tele-Learning worked:

> It's surprising, the longer I teach with the system the more I teach just like I do in the regular classroom. To me the computer and the software are just tools, they are just so many pieces of chalk. Instead of sitting down and doing a lesson plan with a piece of paper I just do it on the computer. I don't look at this as a computer course ... I try to put that all in the background...[6]

South Otselic is a small village in upstate New York. Its few stores do not make much of an impression as one drives through the village. Much of the region is settled with dairy farmers; the country is beautiful with its rolling hills and many farms. It is hardly the place one would expect to find teachers involved with sophisticated telecommunications equipment. Nor is it a place one would expect to find students involved with Advanced Placement English. But in this school district of just over 400 students, grades K-12, many of the graduates will be attending the state's best universities, and one student has been accepted at Yale.

The school is a two-story building, like many others in rural New York state, constructed during the 1930's. The first floor, with drinking fountains a foot and a half from the floor, is for the elementary children. The high school students attend classes upstairs. As I entered the school the students were crowded in the hallways waiting for the first bell of the day; some of the older students could be seen playing games with the younger kids. When I asked for directions to Mr. Foor-Pessin's room, a student guided me upstairs.

Mr. Foor-Pessin interrupted his conversation with several students to greet me. The rows of chairs, bulletin boards, and shelves of books were all reminiscent of my own high school days. In a corner of the room was computer equipment for the Tele-Learning project. Two tables had been placed to form a 'T' so students and teacher could be close enough to speak into the microphone system as well as hear one another over the speakers. The computer hardware (the monitor,

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6 All quotes should be attributed to personal interviews with students and school officials in the Delaware-Chenango BOCES during the time between April to June, 1987.

keyboard, modem, graphics pad and pen, Optel software and printer) had been strategically arranged with monitors visible to both students and the teacher.

I was impressed with how simply the technology operated in the classroom environment. The computer link-up between the two schools was as simple as a telephone call, a task that took only a few minutes. In Oxford the students had received the call in a small study room, where the Tele-Learning equipment is stored. The students are pulled from their various classes every day to meet for AP English between 8:30 and 9:10 AM. Oxford, with its student population of over 1200, is a much bigger school than South Otselic. The high school and elementary buildings are relatively new, while the middle school building was constructed about the same time as South Otselic's.

Once Mr. Foor-Pessin had the students on the line, he began the class by asking each student, in turn, about their business: "Melissa how did the math test go? Holly, how about your paper are you getting it finished? Jim, I heard that you guys won your track meet?" Each person responded in an easy way, joking and talking. The students in South Otselic waited patiently.

The class began by reading directly from the assignment, William Faulkner's Light in August. The passage referred to the main character in a long analogy. Mr. Foor-Pessin stopped the reading and asked if any words in the passage should be added to their vocabulary list. After a polite pause, one student asked about the word "avatar".

Mr. Foor-Pessin wrote the word "avatar" on the graphics pad and it appeared immediately on the computer screen. The hardware, as Mr. Foor-Pessin explained earlier, provided the means for sending messages between the schools. The messages, or graphics, are created by either typing (e.g. using the keyboard) or by handwriting (e.g.using the graphics board). In either case, what is written on one screen shows up instantaneously on the other. Mr. Foor-Pessin uses the graphics capacity of the equipment as a time-saver by preparing electronic "blackboards " ahead of time, then saving them on a computer disk. The system operates such that the teacher can use the computer to display "blackboards" upon demand.

The graphics board also allows for more impromptu responses. For example, Mr. Foor-Pessin had asked the students about the word they had encountered in their reading: "Does any one know what the word 'avatar' means? This is an important word because the author uses it a symbol throughout the book. " A silent moment passed as the students thought, when suddenly there began laughter. On the screen a student from Oxford had written a response: "An avatar is a guitar for a girl." "Oh yeah," one of the girls responded, "then what is a guitar for a boy?" Very quickly the students agreed on the word "simatar". An avatar is, of course, "...an incarnation of a god (Webster's New Collegiate Dictionary)."

After class I had a chance to ask the students about the material they covered:

> We have read a lot of books, I liked them all, but Conrad's Heart of Darkness was the most difficult...We read Outsiders by S.E. Henton, Death of a Salesman by Arthur Miller,

> William Faulkner's Late in August, and Toni Morrison's Song of Solomon, just to name a few. We are about to read Hamlet and we've read some poetry too.

Everyone agreed these books were challenging material, so I asked why students who were busy with other activities (Honors Society, sports, the school paper, the school play, etc.) were willing to take such a difficult course load their senior year. The students expressed a range of motivating interest:

> I took this course to learn what a college course is like...English is really one of my favorite courses, and I thought this would be a challenging course...My course load will be heavy at college and if I pass the AP exam I will be able to reduce my load the first year. (e.g. The students will receive advance placement in English.)

I had expected that most of these students would be English majors, but I soon learned that AP English attracted a diverse group of students. Holly, for example, will be attending Alfred University where she will study ceramic engineering. Natalie will begin at Tompkins Community College where she will prepare for a career in Travel and Tourism. Mary will begin her academic career at Yale; her major will be International politics. Jim will be pursuing his interest in computers at Clarkson. Chris will attend Binghamton SUNY to study teaching with a major in English.

I asked Mr. Foor-Pessin about this mix of student ability and interest, especially in light of the very demanding nature of the AP English:

> Most people don't realize what is really involved in Advanced Placement English so some of the kids came without the best preparation, and that kind of slowed us up...I didn't get through all the material I had hoped...some of the kids were in a little over their heads, but I feel that the kids got a lot this year and for the kids at Oxford it was because of the Tele-Learning program.

The problem of how to select students for the course is a difficult one. If students come to the course improperly prepared, the effect complicates the teacher's job as well as the more able student's opportunity. Of course this is a problem students face in most classes: "Sometimes I would get upset because Mr. Foor-Pessin would have to explain things that I already knew." As more schools are included in the program, however, these problems are likely to become more complicated. This is foreseeable particularly as administrators, who are interested in expanding curricular opportunities, rush to include those students anxious to get exposure to a college course (if not college credits). If this expansion occurs, the teachers will be required to manage these additional students as well as the difficult curricular material.

As I thought about the coordination necessary to organize a Tele-Learning program it became evident that the problems of the Tele-Learning are not confined to technology, as Mr. Foor-Pessin

notes:

> In the beginning you have to get use to the technology, but I think that's a minor issue, the bigger issue is you have kids coming from different backgrounds, different preparations and expectations about the work and their achievement. Despite all this, the students really learned. The papers they wrote got better as the year went on, and additionally they gained more information about themselves through their contact with one another in the program. Some of them learned that they are better students than they thought, while others have learned a measure of humility as they encounter students of comparable ability.

When I asked the students what it was like to have half of their class from another school, their response was strong: "Well, things are getting better now, we don't hate each other any more." I was struck with what a significant step it was for these students to encounter one another. Part of the problem was familiarity, especially in South Otselic with only one-third the student population of Oxford, the students had quite literally grown up together. These students expressed a sense of security in this familiarity, which meant, according to one student, that it was difficult to speak out to strangers: "Sometimes you think that people you don't know are going to laugh at your answers..."

Another student identified competitive tendencies as an obstacle to interaction: "There is so much pressure, everyone wants to be on top, and that creates a lot of competition." These problems lead to friction between the two groups, but the year was not without its examples of grace:

> I knew that Mr. Foor-Pessin was trying to introduce the students in Oxford to his style of teaching and to his system, while we were used to it and we had to be a little patient. We understood how hard it was for them...

Mr. Foor-Pessin commented that there were four major writing assignments, in this course, each based on research and art criticism. The idea of reading as a form of art criticism was new to the students and required some development, Mr. Foor-Pessin recounts an early lesson:

> Literature is like other art forms, and the author has certain intentions when writing a story...we discussed different theories of literature - the imitative theory, the affective theory, the expressive theory - and applied those to literature...I remember talking about the imitative theory. I had drawn a rose on the screen, and I asked how this rose might be modified into an expressive version. Holly [in Oxford] picked up the [graphics] pen and put huge thorns on it. I had made my point.

Referring to a theory of literature, Mr. Foor-Pessin asked the students a rhetorical question:

> When you finish reading a novel like Tony Morrison's Song of Solomon, you ask yourself: 'was she trying to express her own feelings, was she writing with a concern for the change, or was she writing so that her readers can search their own identities and find some baggage which needs to examined?'

These ideas were not accepted by the students without debate. One student told me about her reaction to the analysis and theory of literature:

> We had a big argument one day over whether authors write for the express purpose of teaching. I still argue that people do not read to learn. When you pick a book off a shelf you don't say 'Oh, maybe I'll learn something from this science fiction novel.' Writers may write because they want to teach, but if the person reading isn't versed in how to pick out a theme, or how to pick out messages, they're not going to learn anything. So I argue that people read for entertainment.

As I listened to this student, it struck me that her comments served as a good rationale for an AP English course. Modern fiction is racked by the debate over whether to write for audience entertainment, or whether to write "real literature". Literature requires a literate audience, as Mr. Foor-Pessin notes:

> When the students read a poem, or any literature, they're going to have a reaction. I want them to think about their reactions. I want them to think about their responses and analyze the reasons for their reactions, and the meaning of their ideas.

I reviewed the students' research papers for evidence that they had learned such analytic skills. What I found was impressive. The following excerpts are from several students' research papers, which analyzed three novels in terms of William Faulkner's Nobel Prize speech, in which he stated that good fiction must deal with "...the truth of the human heart in conflict with itself":

> Faulkner feels that literature is written solely for the purpose of teaching the reader, and that this is done by writing about universal truths...Writers have different styles [but] these messages are taught, and they are about the human heart. Morrison beautifully expresses Milkman's revelation to become 'alive' spiritually and emotionally. Swift relates how Gulliver is driven crazy by his disgust of the faults and misgivings of the human race. Conrad tells the story of Kurtz who goes to the jungle, loses everything to it, and becomes evil.(Student paper, AP English, Delaware-Chenango BOCES, 1987)

> Each of these authors presents a character who becomes obsessed with something. This [shows] how imperfect the human mind is. I believe Conrad, Swift, and Morrison are all trying to make us learn something about ourself, our inner self.(Student paper, AP English, Delaware-Chenango BOCES, 1987)

> The novels teach us about the conflict of the heart with itself. They teach about good and evil...[as it does for Milkman in Song of Solomon]...All his past actions flood his memory, and guilt and shame come with them. These two emotions are truths of the heart and they help serve to bridge the gap between the reader and the character, making it easier for the former to relate to the latter.(Student paper, AP English, Delaware-Chenango BOCES, 1987)

The depth of these students' academic involvement, exemplified in the above excerpts, is one measure of the success of this Tele-Learning project. Another is the fact that all the students who began the program finished. Indeed, there appeared to be widespread enthusiasm for the course. One student recounted that when school schedules conflicted, and one school was open while the other was closed, the students at South Otselic came to school on their own time to meet with the Oxford class via Tele-Learning.

I found the source of this enthusiasm to be elusive, not readily yielding to my observations and interviews with participants. Certainly the students recognized that Mr. Foor-Pessin was an excellent teacher, a point they commented on as an important reason for the success of the class. To this point, Mr. Foor-Pessin spent a considerable amount of effort addressing the issues and concerns of the students in the two schools. On several occasions he organized social events which allowed the students a chance to meet informally. On other occasions Mr. Foor-Pessin taught the course from Oxford, which helped the students at Oxford feel like they were an important part of the classroom. These were extra efforts on the part of the teacher, but they appear to be necessary. For these students, working with new students and teachers was a challenge. As one student noted:

> It's a challenge, because all of a sudden you've got people that you've never even met before. They live in a different area, they have different ideas, they have had different teachers. It makes you stop and think about yourself. I think it also helps prepare you for college, because all of a sudden you're in this huge school, and you don't know anybody...my experience in this course has helped prepare me for that.

Other students commented that the course had helped them increase their confidence. Amanda expressed the following:

> It's helped me build up confidence in myself. I've always been a person who just sat back and listened and didn't really participate much. In this [class] you have to participate because they can't read your facial expressions on the other end, and the only way they're going to get to know you is if you communicate with each other...you have to step forward and help yourself. It hasn't always been easy because these people from Oxford have a lot of different views. You have to learn to accept their views, or at least consider them I guess.

As I listened to this young woman, it occurred to me that William Faulkner and Toni Morrison would be proud of this student, for she was addressing the "conflicts of the heart". While other students focused on improvements in their writing and analytic skills as benefits of this course, I could not help but linger on the elegance of Amanda's comments. Such are the lessons of literature: an appreciation of others, an understanding of my own gut reactions, and reasoned thought.

The experience of this case study lends substantive support to the proposition that the Tele-

Learning program can act as a means to provide students of rural schools with additional educational opportunities. Mr. Foor-Pessin used the telecommunications technology to facilitate learning, but one should not confuse the success of a teacher with the success of an educational technology. Tele-Learning provides students with the potential of expanded educational opportunities, but the success of those opportunities will depend as much on the teacher as on the equipment.

AP ENGLISH:
ANALYSIS AND COMMENTARY

JUNE, 1987

When the Delaware-Chenango BOCES initiated the Tele-Learning program, school officials asked two evaluative questions:

1) Does the audio-graphic telecommunications equipment work well enough to enable teachers and students to function successfully in the classroom?
2) Does the Tele-Learning program offer students educational opportunities which significantly add to their learning at school?

These two questions are the criteria for evaluating the Tele-Learning AP English program, taught by Mr. Foor-Pessin of South Otselic Central High School, during the 1986-87 school year.[7] Interviews with Mr. Foor-Pessin, school administrators, other math teachers, the school guidance counselors, and participating students provided evidence to address both these questions with regard to AP English. In a few words, we conclude that the Tele-Learning AP English program worked very well. Students were able to learn complicated material as well as adapt to the new demands of operating a classroom between schools.

The organization of the schools and students involved in this Tele-Learning program is interesting because it was point-to-point. This allowed the teacher to focus on the social interaction of the students, a major claim about the worth of Tele-Learning: that students would become more worldly.

1) Does the audio-graphic telecommunications equipment work well enough to enable teachers and students to function successfully in the classroom?

The Tele-Learning AP English course required Mr. Foor-Pessin to teach two groups of students: one at South Otselic, his home school: and the other, twenty-six miles away, at Oxford Academy Central School. The link-up between the students in these schools was made simply through the telephone service which allowed the "classroom" to be conducted in an interactive manner (i.e. students and teachers could communicate directly both orally and graphically during the class). While there were some technical problems using the equipment, the students and the teacher agreed that the equipment rarely interfered with the operation of the classroom, as one student notes:

> Everything ran smoothly, usually we would get right through to them [Oxford]. It was only a couple of times that we had trouble with the line, usually because someone was on the phone over there.[8]

There were some problems, especially at the beginning of the year, when the students

7 For more on the methodology of the data analysis see the section Evaluation Rationale.

8 All quotes should be attributed to personal interviews with students and school officials in the Delaware-Chenango BOCES during the time between April to June, 1987.

attempted to conduct class with a hand-held microphone. Initially, the microphone was passed from individual to individual. This made it difficult for Mr. Foor-Pessin and the students to carry on a normal classroom conversation. Mr. Foor-Pessin resolved the problem by introducing table top speaker phones. "It was a lot better" says one student "because we could carry on a conversation just like a normal classroom."

There were still other problems, however, because students did not know when one another should speak. Since the students could not see one another, the problem was one of devising a system where they could take turns speaking:

> That was part of what the fights were all about. They would interrupt us and we would interrupt them. Lots of times we'd start answering questions and they wanted to say something, but we wouldn't know because we couldn't see them. So, we came up with the idea that if someone drew an X on the screen everyone would know that they wanted to talk. Mr. Foor-Pessin would then draw a circle around the X to let them know their request had been recognized. This way nobody had to be interrupted when talking.

Opinions about the Tele-Learning equipment (computer, speakers, microphones, etc.) varied, some students felt that the equipment was a constant source of irritation: "I don't like the system, it's not good for sanity." Still other students felt that there were advantages to the system:

> The electronic pen pad and stuff were great because we could make up screens, or "blackboards" and send them to those guys over in Oxford. Sometime Mr. Foor-Pessin would make up his class notes using the computer and we could get copies by printing them out after class.

Despite this cacophony of opinions about the Tele-Learning method the students and teacher all expressed general satisfaction with the course. This unanimity of opinion was particularly clear about the quality of the course and the students' learning:

> In my other literature courses all we ever did was read the books and go over the plot summaries...In this course we got more into depth; into themes and messages and we did more essay writing...This course was really great. I learned a lot.

A second criteria for evaluating the success of this Tele-Learning program has to do with the technical feasibility of managing the classroom. In other words, could the teacher establish a rapport with the students with whom he did not have consistent face-to-face communication? Mr. Foor-Pessin notes that learning about the students was not difficult because, "when you talk about the kinds of issues that we do, the kids are constantly revealing themselves." Mr. Foor-Pessin went on to describe one situation with a student:

> One student was really upset with me because of the grade I gave her research paper...while it showed a lot of promise it still had a lot of major weaknesses...[I thought]

> she needed to be upset because she was selling herself short. She is a very talented student but needs to be challenged. The next take home test she really did a super job, and when I saw her I told her how proud I was of her.

Not surprisingly the student perceived the situation a little differently:

> I still feel to this day that he didn't grade my paper fairly. But he doesn't seem to agree with me. We had to use the MLA [a format for writing papers] and he implied that I hadn't read it. But I did, page for page. I got slightly upset. On this Faulkner paper I worked really hard. I worked about six days on it...

This exchange between student and teacher is as familiar to education as any one can imagine. The experience provides evidence that a meaningful teacher-student relationship can be established in a Tele-Learning arrangement. Further, the example illustrates that challenging homework can be assigned and that students will respond to the responsibility even if the teacher is not immediately present to push them. These findings seem significant, in part because in AP English such examples are readily evident, but moreover, because they suggest that the essence of the teacher-student relationship remain intact despite the different classroom arrangements.

In the preceding sections two aspects of the technical feasibility of the Tele-Learning program (equipment and classroom management) were discussed. In this third section the question of scheduling, which is related to the technical issues of the Tele-Learning program, is addressed.

It should be evident that for the "home" school it was not difficult to schedule students into the AP English class. As the school's guidance counselor noted, "We were going to offer that course, at that time, any way." On the other hand, there were scheduling problems associated with the program. For example, Mr. Foor-Pessin's homeroom class was assigned to another teacher. Further, when Mr. Foor-Pessin leaves the school for Tele-Learning activities, a teacher in the building has to cover his duties. Mr. Gary , the guidance counselor at South Otselic, expressed some concern about scheduling all these variables if the Tele-Learning program expanded to include several courses. But in this case the problems were not difficult, and the guidance counselor seemed willing and able to find solutions to them for the sake of the program.

At Oxford the scheduling problems were more complex but not unmanageable. Perhaps the most serious problem was that Oxford uses a rotational schedule [each period rotates from day to day], which meant that the students had to miss different classes when they attended AP English. Mrs. Fowlston, one of the school's guidance counselors, was not overly concerned about the students missing these classes because, she noted, only the school's best students were selected for the program. These students, she thought, were able to miss a class from time to time without serious problems. This proved to be an interesting point, however, because while these students were indeed very able students, they were also the ones who were involved with numerous other

activities (honors society, the school play, the school newspaper, etc.). Mrs. Fowlston noted that most of the participating students were able to make good decisions about the use of their time, but that the potential existed for students to make very bad decisions which could be difficult to resolve.

In each of the "technical" issues discussed above (equipment, classroom management, and scheduling) it appeared that the Tele-Learning AP English program operated successfully. In each case, however, there were numerous problems that required the cooperation of different people in the school organization (students, teachers, guidance counselors). Without this cooperation the program would have been difficult to operate. In many cases it required the diplomacy of the teacher in order to maintain smooth operation. Mr. Podraza, the principal at Oxford Academy comments:

> Mr. Foor-Pessin did an excellent job. He was excellent about giving me a call if there was any unusual problem, like making sure I got the correct AP Exam, or letting me know when classes were cancelled. On several occasions he got the students together, which really made a difference I think...He made my job easy.

2) Does the Tele-Learning program offer students educational opportunities which significantly add to their learning at school?

Much of the discussion above lends support to the conclusion that this Tele-Learning AP course was indeed a significant learning experience for the students involved. One student expressed a clear opinion about the value of the class, which was representative of all the students:

> My essay writing has improved over the year and I can now do fairly well analyzing a novel. I could have never done that before without this course. I think I did pretty well on the AP test...if I hadn't taken this course I wouldn't have known what to expect of a college course and this has helped with that.

At Oxford the guidance counselor noted several ways in which the program added to the education of students there:

> Mr. Foor-Pessin has had them analyzing novels and I think, for our kids, it might have been their first exposure to that kind of thinking...We're always saying we should do more of it...We do term papers, but they're not the same. I think we have too much regurgitation kinds of things: multiple choice, true-false.
>
> In the past we have surveyed our grads and asked what college courses they had the most difficulty with. A lot of them said English, so if we can do anything to help kids prepare for college, that would be one of the advantages of this program.

The academic advantages of the course were strongly represented during the interviews, but simultaneously there emerged a strong statement about the personal and social growth of the

students. According to Mr. Foor-Pessin the really important lesson students learned was a greater awareness and tolerance of others. Mr. Gary, guidance counselor at South Otselic, made similar observations:

> Some of our students perceive themselves as living in the sticks. Their exposure to students at Oxford, which isn't that much bigger except in the eyes of these kids, has helped them understand that there is a larger world out there. We adults tend to forget just how provincial high school students can be. The Tele-Learning course has given them an opportunity to meet other kids.

As one recalls the students' frustration about the interaction with "those other students" it becomes clearer that it was not the Tele-Learning that frustrated them so much as it was the disruption of their own world with the introduction of new students:

> Well, before this class we always had the same students in our classes, now we have these other students and they are good...I know that I'm not always getting the highest grades and at first that was a downer, but now it makes me work harder because it gives me something to work for.

For other students the lesson was one of tolerance: "At first I used to get mad at them, but now I understand how hard it has been for them to get used to a new system, teacher, grades and everything." In these ways Tele-Learning programs offers students and educators a potentially new and significant educational opportunity. This is a strong argument for the continuation of the Tele-Learning programs.

AP CALCULUS:
THE STORY

JUNE, 1987

Many of the very small rural school districts in New York State are unable to provide their students with the full range of curricular offerings available to students in larger districts. One problem that constrains the scheduling of these courses is limited enrollment. For example, Afton Central High School District has less than forty seniors graduating (in the 1986-87 school year). Of these seniors, only two expressed interest in taking an AP Calculus course. Before the introduction of the Tele-Learning program, these students would not have had the opportunity to take such a course. The students at Afton thought this opportunity was significant:

> In our school, we don't have advanced courses like AP calculus. The Tele-Learning program has given us a chance to gain the exposure we need to prepare for college.[9]

Tele-Learning is not a new idea. During the 1960's teachers would broadcast lessons to students in schools many miles from the broadcast point. Most of these courses were not interactive; students sat passively and listened to the teacher lecture. Further, the students and teacher could not see one another, a problem many educators felt made teaching and learning very difficult. While some school districts, such as those in the St. Lawrence BOCES of New York, have attempted to implement interactive tele-vision distance programs, the technology for this system is both expensive and complicated. In the Delaware-Chenango BOCES, school officials have attempted a less expensive, less complicated technology for their Tele-Learning project, called interactive audio-graphics. Mr. Jones, a math teacher at Sidney Central High School, teaches AP Calculus to students at four other schools. I asked if I could observe him teach and learn how such a system worked. I was curious about the equipment, and about how students reacted to such a program, so I was glad when gave me an observation.

Sidney Central High School is large and modern compared to other schools in upstate New York. The streamlined brick building, which sits on a hill above a small but busy village, is surrounded by playing fields, all green and neatly cropped. As I walked into the building I could see students standing and sitting together in the hall. Mr. Jones, who had been talking with the students, approached me directly: "Mr. Galvin I presume. Welcome to Sidney."

I asked Mr. Jones to tell me something about himself:

> I've been teaching here for twenty-eight years, for most of these kids I've had their parents in the same classes. I've been teaching calculus for the last twenty years. In this school we offer our students a college credit calculus course, through an agreement with Delhi SUNY; I'm an associate professor in that college.

According to Dr. Van Wickler, Superintendent of Delaware-Chenango BOCES, one goal of the Tele-Learning program is to provide an opportunity for students to gain exposure to excellent

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9 All quotes should be attributed to personal interviews with students and school officials in the Delaware-Chenango BOCES during the time between April to June, 1987.

teachers like Mr. Jones. Indeed, in many respects the arrangement of the AP Calculus was a model of Tele-Learning plan: one experienced and qualified teacher uses the Tele-Learning equipment to teach eight students in four other schools (two or three students in each school). I joined Mr. Jones as he sat down to begin his Tele-Learning lesson, which begins by linking up the computers at the students' schools with his computer at Sidney.

"Hello operator, this is Ted Jones calling from Sidney, New York. I need a bridge to set up four locations, and I'll be dialing those numbers myself." This is how a class in Tele-Learning begins, with a telephone call to the operator. A bridge links three or more sites telephone systems for communication. The bridge is the key factor that allows Mr. Jones to teach an Advanced Placement Calculus course from his school in Sidney to students in four neighboring school districts. With the use of computer technology, microphones and speakers, students and teacher are able to carry on classroom conversations despite the many miles between them.

"Hello anybody there? Is this Greg? Hi Jim. Yeah, the line is pretty clear today." Mr. Jones was speaking to the students at Hancock Central High school, over twenty-five miles from Sidney. At that end of the line I knew the three students who were sitting in a small room talking with Mr. Jones. I had visited them earlier in the year. They explained to me how the system worked:

> The modem is the important thing, it transmits both the graphics and the voices over the phone line so we can communicate. The computers are linked up to one another through the telephone line. If we type a message into the computer it is automatically sent to the other sites and is visible on their computer screen. And with this pad [called the electronic blackboard] we can write formulas or whatever, and they show up on the screen of the computer too. Sometimes when Mr. Jones asks a student a question and they are stuck for an answer I'll start writing the formula on the board. Mr. Jones does not know who is doing the writing and my clue will sometimes help the other student get started with the problem.

Back at command center Mr. Jones, who for ease and clarity teaches with a set of head phones, has connected up with all four sites. The process of linking up is not always trouble-free, sometimes the phone connection is so bad that the link-up procedure has to be redone. This is time-consuming since the procedure without any complications takes about seven or eight minutes:

> On the days when the system operates smoothly it works very, very, well but when it was bad I would have Donald Duck sounds, sounded like somebody conversation would come through. Other times I would get error messages and I could not write on the tablet. On other days we would have hardware problems and technical problems. We'd spend fifteen minutes waiting to get on the bridge some mornings. I never have to wait fifteen minutes to start my regular classes.

Mr. Jones was talking to the students about their homework about which I understood nothing. On the electronic tablet Mr. Jones wrote a problem and as he wrote the problem appeared

on the screen. The students asked him a question about one of the many x's, or possibly it was about one of the y's, to which the teacher responded with a flurry of scribbling. Actually, Mr. Jones' handwriting is not that bad, but the graphic images created are not easily read as several students noted:

> We developed a system for reading the screen, Carol would write notes while I deciphered the screen. This actually worked out pretty well because we would do our homework together. I really learned a lot from this class...but the screen was so small, Mr. Jones could never write up a complete problem on a single screen. It made it difficult.

During the forty-one minute class Mr. Jones plowed through several complicated problems. The students asked questions and additional homework problems were assigned. I asked Mr. Jones to compare his Tele-Learning lessons with those he teaches to students at Sidney:

> My tele-learning AP class only meets every other day for forty-one minutes, whereas my regular class meets every day. In my regular classroom I feel a little less constrained for time, so if we finish one example and another one comes to mind we will do that one too. I don't have quite that freedom with the Tele-Learning course. I have an obligation to them because they have that AP exam coming and they're taking that course expecting to cover the material to pass the exam.

The problem of time seemed crucial and I asked Mr. Jones about the student's preparation for the AP Exam, because my interviews with the students revealed that none of them expected to pass the exam. For example Keith, a Junior at New Berlin, commented:

> At first I was doing pretty well. I was following along and scoring well on my tests. Then about January I began to lose it. Mrs. Stevens (Math teacher at New Berlin High School) was helping me but we were moving so fast I just couldn't keep up.

At Afton, Fran, the school's Valedictorian, saw the course differently:

> The course was tough, but I liked the challenge. Brian and I are kind of competitive so we kind of got into it. I'm not sure what some of the other kids at the other schools thought. Sometimes Mr. Jones would ask a question and there would just be dead silence. It made me so mad because I would get impatient...I'm not sure how I did on the AP Exam but I'm glad I took this course. It was good exposure and I know I'll be better prepared for college.

Indeed the exposure to calculus concepts is undoubtedly worthwhile, especially to the serious math student. A question that may be asked, however, is whether such a rigorous approach is appropriate for the students with their varied background. Several math teachers I interviewed in the BOCES district expressed their concern: "I observed Mr. Jones teach his class and the concepts and proofs he presented were quite sophisticated. I was concerned about whether the students were really understanding them." Another math teacher, who teaches a regents calculus course,

commented:

> Calculus is a difficult course. I'm not really sure that these students have the background necessary to really grasp the concepts. In fact I think it takes a second exposure to the concepts before they start to make sense. I teach a watered-down version of the AP course. We go a lot slower.

I asked school administrators about how students had been selected for the program, and learned that students had generally been encouraged to participate in the program. This may account for the substantial drop-out rate, especially in the first month of the course. The problem of selection and preparation for this course seemed especially important as I thought about the program because, as Fran noted above, the inclusion of the less able student had an impact on the quality of the instruction as a whole. I had no idea to what degree the problem had influenced the outcome of the course, but as I thought about the future of AP Calculus it seemed like prudent advice to suggest to school officials that they think a little more carefully about the selection of students for the course. I asked Mr. Jones about his thoughts on the problem:

> I'm here to teach calculus and I'm willing to teach it to anybody that's got the inclination. For the person that's not as well-prepared, it's going to be hard work, but that doesn't doom them to failure. I can work through that if the students are willing. I have nothing to do with the selection process, they just say here you are and I teach them to the best of my ability...If the kid opts out on a daily basis...that's one of the casualties I am going to have to face, I can't do much about it because I can't counsel them like I do my own students...

I knew that Mr. Jones had provided a time for office hours so students could call and talk one-to-one about problems. I asked a student why he had not taken advantage of those opportunities, he said, "I guess I felt intimidated. I had met with Mr. Jones one time previously. And while I called him at first, after awhile I didn't even know what to ask him about." Other students were less inhibited and did call during office hours:

> We called him and talked about our homework. After a while we made the system work to our advantage because we could get Mr. Jones to tell us something about the next assignment and it would help us keep ahead.

In general, however, Mr. Jones was disappointed with the result:

> I'm disappointed with the office hours, it got to the point where they did not take advantage of those and I would go four or five days with nobody calling. I made myself available here from 2:16-3:00 instead of doing things I should be doing for my local students and my local school...it got so they weren't taking advantage of it. It was a tremendous waste as far as I was concerned.

Despite these relatively minor problems, my interviews and observations left me with some strong impressions about the Tele-Learning AP Calculus course. First, I was impressed with how

readily the audio-graphics technology worked as a teaching tool, as Mr. Jones notes:

> At first it was hard to communicate but the more comfortable we all got with the equipment the easier communication became. The big problem was that we were not able to work a single problem on the screen. This, however, was not a big deal and I think we worked through it.

Second, Advanced Calculus can be taught to more than one class of students at one time, but it happens at the sacrifice of interaction between students and teachers. Further, connecting up more than one school to the system is time consuming, an important point for a class taught only every other day:

> We only have forty-one minutes every other day. That is not much time for all the material which has to be covered in an AP Calculus course. By the time you connect up with all the schools and get down to business there is not much time left. I have had to change my teaching style some - I'm a little more structured than I am in my regular classroom.

Despite these limitations, I was impressed with how everyone agreed that learning in the Tele-Learning AP Calculus had taken place. Even students who felt overwhelmed by the topic at the end of the course stated that the exposure to it was worthwhile. Certainly this exposure to calculus is worthwhile, but one must question whether these students might not have been more productively involved in some other enhancement math course. For those students ready and able, however, the AP calculus course through Tele-Learning provided an important educational opportunity.

AP CALCULUS:
ANALYSIS AND COMMENTARY

JUNE, 1987

When the Delaware-Chenango BOCES initiated the Tele-Learning program, school officials asked two evaluative questions:

1) Does the audio-graphic telecommunications equipment work well enough to enable teachers and students to function successfully in the classroom?
2) Does the Tele-Learning program offer students educational opportunities which significantly add to their learning at school?

These two questions are the criteria for evaluating the Tele-Learning AP Calculus program taught by Mr. Ted Jones of Sidney Central High School, during the 1986-87 school year.[10] Interviews with Mr. Jones, school administrators, other math teachers, school guidance counselors, and participating students provided evidence to address both these questions with regard to AP Calculus. In a few words we conclude that the Tele-Learning AP Calculus program worked well but there are reasons for concern. The organization of the schools and students involved in this Tele-Learning program was especially interesting because the teacher taught students from four different schools. Further, unlike the other Tele-Learning arrangements this school year, the teacher taught the course without students in his classroom . This model is close to the ideal the program planners first envisioned.

1) Does the audio-graphic telecommunications equipment work well enough to enable teachers and students to function successfully in the classroom?

The AP Calculus Tele-Learning course required Mr. Jones to call each of the four schools, one at a time, to make the link-up so that the "classroom" could be conducted in an interactive manner (i.e. students and teachers could communicate directly, both orally and graphically, during the class). While there were some problems, the surprising conclusion, given the numbers of participating locations and the distance between them, is that there were no major technical problems with this aspect of the program:

> On the days the Tele-Learning equipment worked it was very, very good, and when it didn't it could be a real problem. We'd spend fifteen minutes waiting to get on the bridge some mornings. I never have to wait fifteen minutes to start my class. We had to call down to Birmingham, Alabama to put me on the bridge in White Plains, New York. The last three weeks I would call up and tell them who I was and they knew exactly what I needed. I had a good rapport with the telephone operators.[11]

The students, likewise, felt that the equipment itself was no real problem: "We walked in here

10 For more on the methodology of the data analysis see the section Evaluation Rationale.

11 All quotes should be attributed to personal interviews with students and school officials in the Delaware-Chenango BOCES during the time between April to June, 1987.

and with ten minutes of instruction we knew how to use it. Now we have a good idea of how the system works." The real problem for the students was the clarity of the graphics. Each student we interviewed complained that when Mr. Jones wrote a problem on the graphics pad, it was hard to read. Mr. Jones recognized the problem but quickly discovered that it was not his handwriting as much as it was the clarity of the graphics program itself. Further Mr. Jones complained, as did the students, that there was not enough room on the the graphics pad to write out an entire problem. Consequently each problem had to be divided up into sections which made it difficult to refer back to earlier manipulations.

AP Calculus is a difficult subject and many of the students commented on that fact. None of the students suggested, however, that their problems were a consequence of learning via telecommunications. Many of the students requested that a visual component to the system be added. When asked why, however, the universal response was, "...because I want to see who I am talking too." Interestingly none of the students gave academic reasons for the request. Further, when I probed their knowledge of other participants in the program, all the students were able to provide a thumb-nail sketch of the other students:

> Fran is nice. He either really knows his stuff or he is pretty good at faking it...Rachel is pretty sharp, but sometimes she did not seem particularly into the subject... We hardly ever heard from the guys in Hancock. I guess they were kind of shy...

Similarly Mr. Jones was able to make contact with the students, as one student comments: " He knew us. He talked directly to us for a few minutes before he put you on the bridge." This familiarity was not universally shared and Mr. Jones acknowledges that he knew some of the kids better than others: "The kids in Afton and Bainbridge, they were always on the ball. I feel like I had a little stronger rapport with them." Other students felt like they were somewhat isolated. It is worthwhile remembering that these students who felt isolated are not the least able ones in the school, rather they are the students for whom school has been a successful experience.

Perhaps part of the explanation has to do with Mr. Jones' view of his role as a Tele-Learning teacher:

> My primary obligation is to my own students. I'm being paid to work for these students by their parents. My life at school is dedicated to Sidney, they're paying the bulk of my salary. And I'm taking two-fifths of my teaching day away from them and dedicating it to BOCES. My Superintendent is saying, 'Yes you can have my teacher's time.' When I'm on the telephone that's when my allegiance is to BOCES, but I don't mix the two jobs, they are separate jobs.

These points are good ones, especially when one considers the time it takes for a teacher with students at several "away" points to facilitate social interactions amongst students. The question Mr. Jones raises has to do with the scope of his role as a BOCES teacher. He says:

> I'm a teacher and they are learners. I'll do the best I can for them. I don't care if they are in Hancock, New Berlin or wherever. The problem is that I can't get on top of these students like I can with my own here at Sidney. I have to rely on their motivation. I had office hours when they could call and talk but after a while hardly anybody called.

From the students' point of view having contact every other day with a teacher you have only met once before about a subject that is very difficult and abstract is lonely business. It is no wonder students wanted visual contact during their Tele-Learning classes. It is not apparent, however, that visual component of telecommunications would resolve their feelings of isolation, since it is social interaction which addresses feelings of isolation and not simply visual stimulation. Audio-graphics does provide sufficient interaction for many of the students to address issues of isolation.

Homework assignments are another issue. Discussions with the teacher and students revealed that students generally did their assignments. The problem was transporting them in a time-efficient manner between teacher and student for comment and correction. Mr. Jones made use of the U.S. Postal Service. The result was long delays between taking a test, for example, and getting the results back. A better use of the computer technology could be made; assignments could be made on the computer disk and students could send their answers back to the teacher with no time delay. Tests could be conducted similarly. Further, if a network system of communications was developed then students could work with one another on problems, facilitating the social problem of isolation discussed previously.

The last category for evaluating the technical feasibility of the Tele-Learning AP Calculus course has to do with the ability of the school and students to schedule the course. Generally, the school guidance counselors and administrators agreed that as long as Tele-Learning was only for a few students, then the trouble of rearranging schedules is not overwhelming. If the Tele-Learning program expands and more of the less able students express interest in being included, then the problems of scheduling may be a limiting factor in participation. Certainly scheduling problems account for some of the attrition rate of students involved in the AP Calculus course. But as long as all the school districts run on very different schedules for all the various reasons the problems of scheduling will complicate the smooth operation of the course.

In summary, the Tele-Learning equipment worked reasonably well with the AP Calculus course. Indeed, the only real concerns expressed by students and teacher about the equipment focused on the poor graphics, which made problems difficult to read. Technically the teacher was able to manage the "classroom" but it seemed significant that the students in the Hancock and New Berlin schools felt less "tuned in" to the class then the students in Bainbridge and Afton. It is difficult to assign this feeling to the multi-point Tele-Learning arrangement, but it does seem reasonable that such an arrangement would be more difficult to manage than a simpler point-to-point arrangement. Finally, we expressed some concern about the problem of scheduling, while at the

same time acknowledging that school officials generally did not view this as a significant problem. All in all, the the program worked surprisingly well given the history of educational innovations.

2) Does the Tele-Learning program offer students educational opportunities which significantly add to their learning at school?

For some of the students the Tele-Learning program offered an opportunity to gain much desired calculus skills. Fran, from Afton Central High School, was such a student:

> I'm very good in math and calculus is a challenge. I'll take it again next year. If I pass the AP test, then great, I'll take the next calculus level. If not, I will have gained some exposure to it and I'll recognize it and understand it more when I have it again. It's real good backup and will help me out a lot when I get to college.

Certainly for Fran the Tele-learning AP Calculus course offered a significant educational opportunity. For other students, like Kim, who was identified as the most able math student at New Berlin, the course had less to offer:

> For one thing I was taking two math courses, math thirteen which is really calculus and then I was taking AP math. That got to be a lot of work and confusing because we were doing two different things and I'd have to keep straight what I was doing in each class. I didn't really like the computer. I didn't like being taught from a computer, I like the teacher in front of me. It was hard to hear them for one thing, and then when he was writing I couldn't read his writing very good. It doesn't come over the computer very clearly. Finally there was a lot of interruptions and we didn't really get much done. I'd go home and try to do the homework and didn't really understand it because we didn't have much time - there were three other schools doing it and if they had a problem we had to wait for them to get their problem solved and it was just a lot of interruptions and a lot of wasted time.

The contrast in comments of these two very able students point out some important issues. For Fran the course was not available by any other means. For Kim, math thirteen covered much of the same material and the "computer" seemed a much less attractive means of instruction compared to Mrs. Stevens in front of the room. The fact that Mrs. Stevens does offer students at New Berlin a calculus course - she admits that it does not cover as much material as the AP course - seems to offer a partial explanation for why five of the eight students initially enrolled in the AP course dropped it.

For the students in Hancock, the problem was one of preparation: "We have never had any of this stuff before. So I guess it is good exposure. We don't expect to pass the AP Exam. " The issue of preparation is key to an assessment of the worth of the AP Calculus course. If

administrators, teachers and students all agree that "exposure" is sufficient grounds on which to base continued participation in the program, then one can argue that the program is worthwhile. But it is not clear to me that both student time and teacher time could not be better spent working in some enhancement program designed to prepare students for a calculus course. This is exactly what Mrs. Stevens is doing in New Berlin, and with apparent good success.

Mr. Smith in Bainbridge Central High school, similarly suggests that the two students' time could have been better spent doing less complicated math. These two students, while proud of themselves for surviving the AP course, admit as much:

> We never had anything like calculus before, never at all. Plus a lot of the stuff was really abstract at first. We don't deal with abstract stuff that well. Give us specific examples and problems then we can do it, but just sitting here day after day listening to abstract stuff, we were totally lost...We weren't really into it that much, just something different and something to learn that's new. We figured if we take it [calculus] in college we'd have a lot more background than most people going in.

Mr. Jones expressed his general satisfaction with the course. The opportunity, he says, is there for the motivated student. The course material is almost the same as that which he teaches in his calculus course at Sidney. Despite this great potential, it seemed in the end there was an element of disappointment. He was disappointed with those kids who dropped out: "I have only had a few kids drop out of my course in the twenty years I've been teaching it." He was disappointed that the students did not use the office hours: "That was a golden opportunity for students to get one-to-one help." He was disappointed that the students did not take the AP Exam: "I'm not sure why they didn't take the exam. I guess there was some kind of administrative foul up at one of the schools."

If exposure is the criteria for success than certainly these students were exposed to material and ideas to which they never had been before. As Mrs. Stevens noted: "By Christmas the AP students were beginning to get into things we would only touch on. By March they were into things we would not even address."

If, on the other hand, the students were supposed to come away with a serious chance of passing the AP Exam, then it is more difficult to claim success. If these are the grounds for participation then school officials need to be more careful about selecting those students who are able and prepared for such an advanced course. The future, however, may hold a different possibility as Fran noted:

> There will be kids in Afton who will be able to take advantage of AP Calculus. They are starting in the 7th grade now, with six kids taking Math I. Then in 9th grade Math II and 10th grade - Math III. By 11th grade they could have taken both Math III and have that touch on precalculus. Then they could come here in 12th grade and be ready for AP Calculus.

Fran makes a good point, we need to think about the future. Maybe educational administrators need to maintain the organization of a Tele-Learning AP Calculus course so that the Advanced Placement courses will be ready and waiting for these young students working under the requirements of the new Regents Action Plan.

SPANISH III:
THE STORY

JUNE, 1987

Recently the New York States Regents Action Plan mandated that all schools offer their students three consecutive courses in at least two languages. For some schools, especially the smaller rural ones providing such courses will be difficult. One solution to this problem is through cooperative efforts, such as the Delaware-Chenango BOCES Tele-Learning Project.

This project takes advantage of communication opportunities offered by both the telephone and modern personal computer. Using these tools a teacher in one school can communicate with a student in another, and in this respect a student in one school can be included in a class of another school. The potential of this system is that smaller schools can now offer their interested students advanced language courses, where in the past limited enrollments would have made such arrangements unfeasible. Such is the arrangement between students in the Mt. Upton Central School and the Downsville Central School where Mr. Kromer teaches Spanish III.

For the last ten years, Mr. Kromer has been teaching Spanish at Downsville Central School in a relatively wealthy school district near the Catskills region. During these years, Mr. Kromer has developed a successful program; in a school which graduates fewer than seventy students every year, there are six students enrolled in the third year Spanish course. Mr. Kromer has, for the last year, included a student from Mt. Upton in this class through the Tele-Learning project. In the Spring of this school year I traveled to Downsville to observe that class at which time I had a chance to talk with the teacher and students.

When I met Mr. Kromer, he was sitting alongside the telecommunications equipment at the end of a conference table in the Tele-Learning classroom. He was preparing for the next Spanish class but instead of writing on the blackboard he was writing his class notes on a computer graphics notepad. As he wrote on the "electronic" notepad I could see the writing appear on the computer screen. Mr. Kromer explained that the student at the other school had a similar computer and that she would be able to receive these screens of notes when he sent them over the telephone line. I was familiar with the use of modems and this idea was not new to me but I was curious about how it affected the operation of his classroom:

> The tele-learning has been great and user friendly. I think we've had a good year. This thing has made me more on top of things because I've had to structure my time more productively. I've had to prepare a bit more than I do in a regular classroom situation. The machinery helped me because I'm able to go home and prepare a 'blackboard' and do lesson plans on the floppy disk. It's state of the art. I felt proud I was able to use this stuff.[12]

As I talked the students began filing into the classroom. Eric, a junior, and Walter, a senior, are two of the best students in the class. Both of these students passed the Regents Spanish Exam

12 All quotes should be attributed to personal interviews with students and school officials in the Delaware-Chenango BOCES during the time between April to June, 1987.

at the end of Spanish II (most students take the exam at the end of Spanish III). After class I had a chance to ask them about their experience:

> In Spanish I and Spanish II Mr. Kromer taught everything very accelerated. We were basically a group of kids who could handle more work at a faster rate, so at the end of Spanish II, we passed the NYS Regents exam and got credit...Mr. Kromer is really a great teacher. I think he knows at least seven different languages.

When all six students had arrived, Mr. Kromer introduced me and then began the class immediately. The students sat in a semi-circle around the computer screen, with Mr. Kromer next to the equipment. He dialed the phone and reached Angela at Mt. Upton:

> Mt. Upton? Angela are you there...Good! Angela, I am going to send you the screen with the words for our dialogue today. Are you ready? Ok, here it goes. This will only take a minute.

As Mr. Kromer managed the telecommunications equipment, the students quietly joked with one another. Later I asked some students about their perceptions of the Tele-Learning course. Their responses were varied:

> I like it, but sometimes it is difficult to hear and that makes it hard to just talk about things. Like someone will tell a joke and Angela, in Mt. Upton, will not be able to hear so we will have to explain it to her..The sound is the biggest problem...A lot of times the pen pad doesn't work and if something goes wrong with the computer we spend ten minutes waiting and it gets boring.

When Angela had received the class notes, Mr. Kromer began the instruction. Speaking in both Spanish and English he began asking each student questions. The sound system is set up through a hand-held microphone. Each time Mr. Kromer asked a student to use a word in a sentence he would pass the microphone to that student, who would then speak. Once the answer was given that student would then either return the microphone to Mr. Kromer or pass it on to the next student. The system worked remarkably well, with the students occasionally helping one another with the more difficult problems.

As I observed the class I recalled my earlier interviews with Downsville's Superintendent, Mr. Hyde. While expressing strong support for the Tele-Learning program, Mr. Hyde was concerned about the effect such a program had on the Spanish students in Downsville. I asked the students about their reactions:

> This year we do more drill than compared to Spanish I and Spanish II. I wish we could do more dialogues, that's where I really learn Spanish...When we're on line Mr. Kromer would target the lesson at Angela because it's difficult for Angela to understand, the sound is not so great...maybe it should be that way because when we're not on line he can target everything at us.

The students from the two schools meet on line every other day. On the days students in

Downsville are not on line, they meet with Mr. Kromer in a regular classroom. There they develop the conversational skills of the language. For Mr. Kromer, this arrangement provides "the best of both worlds, drill and conversation." I asked Mr. Kromer about adjustments he has made for Angela when on the tele-conference equipment:

> Angela is a top scholar and salutatorian of her class...I ran the gamut this year, I had a kid who got a fifty on the Regents [mid-year test] and a kid who got 100. In fact I had three kids score below sixty, along with two who scored ninety-six and 100 respectively. That is a tough row to hoe even if it had been in a regular classroom all the time. I would have used drill more this year regardless of Tele-learning, so having Angela has played no part in that.

When I asked the students about these differences they admitted, "Walter and Eric, they are ahead of us, we don't get things as fast as they do. It must seem kind of slow to them." Indeed, both Eric and Walter expressed the same point when they noted that they were not really motivated this year because they had already passed the regents exam. Interestingly, they continued to take the Spanish course because it was fun. This seemed quite believable as I observed Mr. Kromer's comfortable interaction with the students.

As the students finished their drill, Mr. Kromer announced a "pop" quiz. The reaction to this was as time-honored as one might predict: "Oh no! I'm not ready for this." Unlike other classrooms, however, Mr. Kromer did not pass around a quiz test paper, rather he turned to his computer and began typing the few commands necessary to identify the file he had prepared for the quiz. Very quickly the screen on the computer was filled with a list of ten questions. The students in Downsville begrudgingly pulled out pencil and paper, and began working on the quiz. In Mt. Upton, Angela began using her computer to type in her answers. Ideally, Angela would fill in her responses so that they could be reviewed at the same time the rest of the class corrected their quizzes. Unfortunately, the system did not work quite as planned and Angela's answers became jumbled so that Mr. Kromer had to rely on verbal checks.

As I observed this class, it seemed apparent that conducting a course with the Tele-Learning equipment was not as difficult as I had imagined. In most respects the classroom functioned in a familiar manner, with very few problems. My observation of the "pop" quiz helped me realize, however, that the technology has its limits. Mr. Kromer seemed aware of these constraints:

> It's been a difficult chore to deal with the interruptions and the hassles. The biggest problem has been the quality of the sound. It's terrible. Occasionally we got glitches in the phone system which fouled up the screen so we couldn't use the graphics pad...but we overcame all this...sometimes we had to spell out syllables to be understood but we made do.

Indeed, such problems did not prove insurmountable, as seems evident in the fact that all of the students passed the Regents exam taken in June, 1987. This seemed especially significant to

Angela, in Mt. Upton. The Tele-Learning project offered her a course and an educational opportunity which she would not otherwise have had available.

As I observed the Tele-Learning Spanish class came to a close, I found my initial skepticism of the system to function well for advanced language instruction fade. While I was not able to ignore the fact that Angela was an excellent student (a "self starter" as Mr. Kromer describes her), the fact remained that she had completed the language course and passed her Regents exam. In Downsville the students had likewise successfully passed their exams. Mr. Kromer had expressed an enthusiasm for teaching on the system, which seemed significant for rural schools interested in retaining their teachers. And finally, while the students had some complaints about the "classroom" via Tele-Learning, they generally felt like Angela was part of the classroom:

> She understands most of the stuff that goes on in here. Like if we have a joke we can tell her and she will laugh...Most of the time I feel like she is right here in the classroom. We have met her a couple of times. At Christmas time, for example, we all got together. I think it is good to know someone from another school. She is a good student and she has good ideas.

Thoughts about the human dimensions of the Tele-Learning project were most prominent in my mind as I drove away from Downsville after my observation and interviews. The technology had obviously provided the teacher and students with a means for conducting a successful class, but equally as important it had provided the students and teacher with an opportunity to meet new and interesting people. In a closing comment Mr. Kromer made this point clear:

> I have worked with these kids in Downsville for over three years now. It has been good to have a new person in our class. Angela has really added a lot to the course this year. I'd be happy to continue teaching these courses. I'd be sorry if students were not able to have language opportunities just because of the school they attend.

SPANISH III:
ANALYSIS AND COMMENTARY

JUNE, 1987

When the Delaware-Chenango BOCES initiated the Tele-Learning program, school officials asked two evaluative questions:

1) Does the audio-graphic telecommunications equipment work well enough to enable teachers and students to function successfully in the classroom?
2) Does the Tele-Learning program offer students educational opportunities which significantly add to their learning at school?

These two questions are the focus for evaluating the Tele-Learning Spanish III program taught by Mr. Bill Kromer of Downsville Central High School, during the 1986-87 school year.[13] Interviews with Mr. Kromer, school administrators, and participating students provided evidence to address these questions with regard to Spanish III. In a few words, we conclude that the Tele-Learning Spanish III program worked well, but we do have some concerns especially about the quality of the experience for the students in Downsville.

The organization of this Tele-Learning program was interesting because the teacher taught six students in the "home" school (Downsville) and only one student in another school (Mt. Upton). Unlike the other Tele-Learning arrangements this school year, this program was arranged for the opportunity and benefit of one student. This is one model the program planners had in mind when designing the project. The question arises as to whether the provision of an opportunity for one student is done to the detriment of the students in the home school.

1) Does the audio-graphic telecommunications equipment work well enough to enable teachers and students to function successfully in the classroom?

Teachers and students generally agreed that the equipment did not interfere significantly with the operation of the classroom. There were problems, as noted in the story. The main complaint had to do with the quality of the sound. Indeed, several of the students suggested that the limitations of the microphone made both hearing as well as dialogue difficult.

Remember, in Downsville the students shared one hand-held microphone which had to be passed from individual to individual, each in turn, as they spoke. Clarity of sound is obviously important for students of a language, a point Mr. Kromer made when he commented that sometimes he had to spell out the syllables in order to be understood. Observation of the class revealed, however, that students understood the communication between Mt. Upton and Downsville. This understanding is, no doubt, the product of several semesters cooperation but it seems apparent that the poor quality of the sound is not reason, in and of itself, for assuming that language cannot be taught via Tele-Learning.

The second problem had to do with the limitations of a single microphone for student

13 For more on the methodology of the data analysis see the section Evaluation Rationale.

conversation. The implications, as these students note, were both academic and social:

> I think it would be better if we could have more discussion. If we could have the speaker phone in the middle of the table then everyone could speak. I feel strongly that it is important. Sometimes I'll grab the microphone and say 'Hello' to Angela because I feel we are so separate. I want to say 'Hi! How are you?' so it's more together.
> You really can't carry on any dialogues in this class. Last year we had more conversations, we had to talk during class, but you can't talk in class... I used to speak better Spanish but since we don't have dialogue anymore it's got worse.[14]

It is difficult to say whether the students who took this Tele-Learning course would have felt more secure about their conversational Spanish in a regular classroom environment. The point remains, however, as a warning to teachers and administrators: there is the possibility of spreading the teacher's attention too thinly at the expense of the students to which she or he is more directly responsible. In this case, Mr. Kromer appears to be cognizant of this responsibility and one cannot ignore the fact that all the students did pass the Regents exam.

While the students at Downsville sometimes felt separate from Angela in Mt. Upton, Mr. Kromer seemed more familiar with Angela's strengths and weaknesses as a student. This is probably best exemplified by the fact that Mr. Kromer spent some of his own time tutoring Angela with material that "...could not be communicated via the system...it was only about three or five per-cent of the material but it was crucial stuff." Mr. Kromer's awareness of his students and their capabilities lends support to the proposition that the system does not depersonalize communication between student and teacher. The fact that he had to use his own time, however, suggests that arranging conferences for special help is difficult. Indeed, scheduling was described by both students and teacher alike as the most serious problem facing the Tele-Learning program.

These scheduling difficulties have proven persistent both within and between schools. As Mr. Hyde, Superintendent of schools in Downsville noted, the new Regents Action Plan sets so many requirements that for many students there is little room for scheduling alternatives. This problem is especially apparent as Mr. Kromer considers scheduling Spanish IV next year:

> I had two kids for Spanish IV next year and when they found out that in order to take Spanish they couldn't take band or chorus... plus they would have to take seven courses during the day...this is a local school and there are just not enough periods in a day for everything. Mt. Upton was having trouble scheduling their students as well, and they were just about ready to accommodate us when it turned out that our local students were dropping out. So I don't know if we will be on line next year or if we will pack it in.

Such scheduling does not impact only on administrators. At Mt. Upton, Angela made several sacrifices in order to take the Tele-Learning Spanish class. Significantly, she had her Regents

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14 All quotes should be attributed to personal interviews with students and school officials in the Delaware-Chenango BOCES during the time between April to June, 1987.

Social Studies which met at the same time as did the Tele-Learning Spanish. The Social Studies met five days per week, where the Spanish met every other day. Consequently, Angela had to regularly borrow notes from the teacher and classmates for days she missed.

Other students who began the course at Mt. Upton were less dedicated. Diane, for example, found the scheduling conflicts sufficiently troubling that she dropped the Spanish course. Mr. Kromer is not optimistic about the scheduling problems:

> It is going to be a persistent nagging problem until you either put more periods in the day in these local schools or I don't know what. After school is no good. You can't run [Tele-Learning] after the regular school day because students have sports, and that's an important part of their school program. And also there's the problem of busing. We run 135 square miles of school district here and you have somebody driving to East Branch at 4:00 sharp, so that's a problem. I don't think Tele-Learning is ever going to be successful until something is done with the scheduling.

The Tele-Learning Spanish III course demonstrates the capability of teachers, students and administrators to overcome the limitations of equipment, distance and scheduling problems. In every respect the participants of this program should be commended for their successful efforts. But acknowledging their achievements at the same time acknowledges the obstacles that must be overcome: poor quality of sound, glitches in the software, poor speaker phones, and conflicts in scheduling. These problem areas are not insurmountable, as is demonstrated in this case study. The problems are significant, however, a point students, teachers and administrators all recognized. Mr. Kromer makes the point specifically:

> Tele-Learning is a solution to small classes, but its no solution to scheduling problems. It makes scheduling problems worse. Unless something is done to open up these class schedules, it will kill the program. I really don't see any hope for it.

2) Does the Tele-Learning program offer students educational opportunities which significantly add to their learning at school?

While Mr. Kromer expressed satisfaction with the progress made in the Tele-Learning Spanish III course, students had more mixed responses. First, however, it is important to note that all the students passed the Regents Spanish exam. In this respect, it was hard to accept the students' frustrations as substantive problems.

For Angela, at Mt. Upton, to whom this course would not have otherwise been available, Tele-Learning was obviously a significant opportunity. For the students at Downsville, where the teacher would have taught this course regardless of Tele-Learning, the question is whether the program detracted or supplemented their learning. Several Downsville students expressed concern

that the Tele-Learning components of the program had interfered with their learning. These students suggested that, in order to accommodate Tele-Learning, Mr. Kromer had to focus the lessons with Angela in mind. Further, these students stated that the use of the hand-held microphone had limited classroom lessons to drills, with not enough time given to conversational Spanish. The result, these students say, was that the class was actually detrimental to their progress.

These frustrations are hard to interpret. On the one hand, the students expressed a consistent set of concerns: less focus on conversational Spanish and more reliance on drills, mostly for the benefit of Angela in Mt. Upton. On the other hand, they all passed their Regents exam and the teacher notes that the focus on drill had more to do with the disparate mix of student ability composing the class than Tele-Learning. Recall that several of the students had, before the beginning of Spanish III, already passed the Regents Spanish exam, while other students were not nearly so well prepared. Under such conditions some students required drill while others were ready for more advanced Spanish. Further, several of the students admitted a loss of motivation, "I am a senior and this is my third year and I just am not as motivated as I was last year."

These remarks by students seem to reflect more of a general attitude about school than of specific instructional problems associated with Spanish III. To debate this point further would be at the expense of a larger point, which is that teachers probably do have to change their instructional format in order to accommodate the Tele-Learning equipment. As the equipment improves, students and teachers will probably be able to carry on with a more conversational classroom environment. In this respect, the arguments about the limitations of the equipment seem like a minor point. The more important point has to do with the discrepancy in student preparation within the Downsville class, as well as between the students of the two schools. If a teacher from a school with a well developed language program, includes students from schools with less developed programs then they will be confronted with the dilemma of how to teach the material: should the teacher review for the sake of the new students or press on for the sake of the more prepared students?

These are problems any Tele-Learning teacher will have to consider. Mr. Kromer found a solution in alternating between drill and conversation, between individualized and group instruction:

> I ran the gamut this year, I had three that scored below sixty-five along with two who scored ninety-six and 100 respectively. Tough row to hoe even if it had been in the classroom, so having Angela has played no part in that. Walter would have been bored in this class even if it had not been tele-learning. Eric is the same thing, they're far beyond the other students. I think we had the best of both worlds, we were able to be up in the classroom and do conversation and work individually then when we came down here and it's by the book. It was very, very different every other day. That might have disturbed them I don't know.

These compromises are always subject to some debate. Mr. Kromer was, however, able to successfully teach his Spanish III class via the Tele-Learning program. To the point, students attended the class, learned the material and passed the Regents exam. Further, Mr. Kromer enjoyed the class and expressed a willingness to teach another one.

I had expected language to be particularly difficult to teach using the Tele-Learning system. The evidence at Downsville is that the system is capable and flexible enough to handle even the toughest jobs.

ELECTRONIC FIELD TRIP:
THE STORY

JUNE, 1987

"On Monday it was hard to pay attention during class. All I could think about was the interview." Bob is not normally so excited about school. In fact, he said he was generally unhappy at school. "But this day was different. At the end of the day we got out of class a little early and set up the equipment for the [conference] call. Some of the teachers and even parents came to listen to the interview." Bob was one of eight students who had a chance to meet Paul Kantner, a musician and rock and roll star who in the past has played with the Jefferson Airplane, the Jefferson Starship and currently plays with a band known as KBC.

According to Dr. Van Wickler, District Superintendent for the Delaware-Chenango BOCES[15] many students in rural schools are so geographically isolated that the only chance they have for meeting people outside of their local area is through a special program called Electronic Field Trips. Thus, in contrast to traditional field trips where students are bused out to meet the "world," the Electronic Field trip beams the "world" in to the students who remain in their school.

An Electronic Field Trip does not, however, require STAR TREK like gizmos in order to work. The students in Hancock, for example, were able to contact Paul Kantner in San Francisco, California with no more than a telephone conference connection. Other classes in the same BOCES District, have made contact with various people around the world.[16] Near home, for example, one sixth grade class interviewed the mayor of Binghamton, New York: Juanita Krebs. Several other teleconference calls have been made to students in Australia, Alaska, South Africa, and England. The list of possible contacts includes academics, social activists, artists, authors, historians, steel mill workers, and even mathematicians.

As I talked with teachers and administrators about the Electronic Field Trips it became clear that not everyone was convinced of the value of such projects. Several teachers I interviewed commented that they were not prepared to spend an hour of their class time in order to prove the electronic wizardry of telecommunications: "If I saw some reason for using such a project then I would," said one teacher, "but as things stand now it just seems like a pet project for the BOCES."

Mr. Robert Taylor, Director of Instructional Support Services for the Delaware-Chenango BOCES, recognizes that Electronic Field Trips have their limitations. He notes, however, that with proper preparation these field trips can provide students with important experience as well as interesting instructional opportunities.

As I drove toward Hancock, through the Catskill Mountains in New York, I wondered what this opportunity of interviewing Paul Kantner had meant for these eight students. I had heard each student did a research paper in order to be selected for the interview panel. What had they learned? Why was their time not better spent in the classroom? What kind of students were interested in talking with a forty-seven year old Rock & Roll star?

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15 BOCES: Board of Cooperative Educational Services, a regional educational organization.

16 In some of these cases, teachers and students have used an IBM personal computer and modem to enhance their communications.

Hancock is a small town, situated just along the Pennsylvania New York border on the Delaware River. Route 17, once described as the most beautiful highway in the country, rolls right by the town. Most of the traffic in town is local: employees at the lumber mill, shoppers at the grocery store, drug store or hardware store.

The school, situated near the village center, is the largest building in the town. The three story brick building, built in the early 1930's stands neatly in several acres of rolling green playground. Inside the building shows its age. The stairs are worn smooth from thousands of feet climbing the same path over and over. The hallways are cavernous, with ceilings twelve feet high. There is warmth of this architecture which is clearly evident in the lovely oak finish of the main office. It was here that I first encountered the students I had come to meet.

Two weeks earlier these students had interviewed Paul Kantner, who as I described above is a pretty famous rock and roll star. It was several months before this date that Betty Wasiluk, the BOCES Tele-Learning Project Coordinator, had sent Kantner a letter asking if he would consider such an interview. Betty was a little surprised when Kantner's manager called her about arranging the interview. She said she had sent out lots of letters to local people, who she thought would have more time and interest, without much response.

Betty knew that Warren Fredrick, the music teacher at Hancock, was interested in any field trip that included musical figures. Unlike other teachers who were unsure about the value of such a project Fredrick seemed to be very clear about what he wanted:

> I thought this was great news, and I accepted Betty's offer immediately. I had two problems, however. First, I only had two weeks before the time of the interview. Second, I knew that I would not be able to include everyone in the teleconference. My solution was to have the kids write a research paper about Paul Kantner and his music. Then I would choose kids according to the quality of their paper, their effort and interest.[17]

Initially about twenty-five kids expressed interest in participating with the teleconference. Very quickly, however, only eight kids who were serious about the project were doing the research. Now they all stood before me: some tall; some with lots of hair; seven young men and one young woman.

Hancock school is not large or wealthy, but the students perform well on state tests and many of them want to go on to college. Lisa for example, is applying to a special musical school in Pennsylvania where she can continue studying piano. The other seven students all gave her support, "Yeah, Lisa can really play!" Lisa's eyes were bright, she was among friends who understood her aspirations.

Matt wants to be a guitarist. He likes school but is really looking forward to going on to a

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17 All quotes should be attributed to personal interviews with students and school officials in the Delaware-Chenango BOCES during the time between April to June, 1987.

performing arts school where he can study music. Likewise Karl and Leslie have similar ambitions. "I wake up in the morning and practice my guitar," said Karl "and then after school I practice some more." Indeed, after school I found Karl in the band room setting up his guitar for practice.

Tom, tall and friendly, tells me that he plays music by tuning it in on the radio; he wants to be a disc jockey. Shawn and Greg both laughed because neither one of them play music. Shawn, a determined young man, wants to play professional sports. Greg is interested in business. All three of these students plan on attending college.

Bob is the only one who seems uncertain about his future. I asked him why he was interested in talking with Paul Kantner. "It sounded like fun," he said. "It was a chance to learn about other people. I couldn't believe that someone like Kantner wanted to talk with us. I mean we're just out here in the sticks."

Shawn joined in agreement with Bob:

> The thing I liked about the interview was that it made me feel good that Paul Kantner would take time out of his day and talk with us. I mean he didn't know anything about us, but he said he was willing to do the interview because of the sincere way he was asked.

The most striking characteristic about this discussion was how supportive and cooperative it was. Matt joined in and began to describe the interview:

> We were all seated at this table, the school board members allowed us to use their meeting room. We had been preparing for this interview with Kantner for over two weeks. When we started the interview I had my five questions but we talked so long I had to think up six new ones. We talked over an hour and fifteen minutes. I think Paul Kantner would have talked longer. He was great because he really talked to us. He asked us questions and then listened to our answers.

I asked the students about their questions for the interview: "It sounds like you were really prepared when you finally started interviewing Kantner?"

"Yeah!" was the enthusiastic response. "The research was really important because it helped us ask intelligent questions." Each paper had been based on the material gathered by the school librarian in cooperation with the BOCES School Library System. The students applauded the librarians' work, who they said, "..could get you anything you needed for our project." Mary Joe Law, one of the librarians, had set up a research center for the students, which included a record player for listening to Kantner's music.

The librarians' research was not the only source of material for the students. A few days before the scheduled interview, Jim was listening to the radio:

> I remember just a few days before the interview. I was laying in my bed about to go to sleep when I heard Paul Kantner's name on the radio... the radio station was carrying an

interview with Kantner, so I got out my tape recorder and recorded it. The next morning I brought the tape into school and added it to our research library. It was amazing how his name started to appear everywhere in my life.

Each research paper was about Paul Kantner, his history and his music. Mr. Henry, the English teacher, helped the students with their papers. All eight students finished a research paper. One student describes the players of Kantner's original band the Jefferson Airplane:

> There was Jorma Kaukonen, a tall thin guitarist. Jack Casady, a spectacled (this is the correct word for wearing glasses) bass player. Signe Anderson, helped Balin and Kantner with the vocals. Skip Spence was the drummist...This band was a dream, a playground, a business, a podium, and an asylum for its members... On their first night, Friday the 13th August 1965, RCA signed them to a five year contract. (Keesler, unpublished contest paper, Hancock Central High School, 1987).

Another student commented on Kantner's music:

> The Airplane was flying high. They sang songs that dealt with politics, and social observations crossing the line between sarcasm and viciousness...During the Vietnam war, Kantner showed his feelings when he released his first solo album Blows Against the Empire.
>
> Dragon Fly was the first album of the new group called Jefferson Starship. This group contained the talent of Kantner, Slick, Frieberg, Bassist Pete Sears, and a eighteen year old lead guitarist, fresh out of high school, named Craig Chaquico. (Esolen, unpublished contest paper, Hancock Central High School, 1987)

In 1986 Kantner, Balin and Casady teamed up with other musicians to form a new band called the KBC. This student writes about Kantner's new band:

> With the creativity of these fine musicians and their abilities to improve, the KBC band is expected to make a strong impact on the music industry. They will be introducing a new form of creative progressive, Symphony Rock and Roll. KBC is a name everyone will soon know and long remember (Esolen, unpublished contest paper, Hancock Central High School, 1987).

After writing a research paper, each student had to write a set of five questions for the interview. Tom who would ask Kantner about his own musical tastes commented:

> When I first started to think up questions I found the answers in the articles I read. So Mr. Fredrick said I should think up new questions. We even had a pizza party a few days before the interview where we practiced our questions. You know about taking turns and stuff.

Matt who was concerned about the music business and producing music agreed with Greg about the research and questions:

Yeah, we wanted to ask intelligent questions. We didn't want to ask about his love life and stuff like that. We wanted to ask about what it was like to perform and how he got started and stuff like that.

Meanwhile, BOCES personnel had been in constant contact with Kantner and his manager to ensure that the arrangements followed through as planned. As the date for the interview approached Kantner had taken a further interest in this interview (it was just one of several scheduled this day) and he asked for some information about the project, the school and the kids. Kantner said that he just couldn't get over the fact that he was the topic of study in a high school.

On Monday just after school the participating students at Hancock Central High were all seated around a large conference table ready to place their call to Kantner noon-time in San Francisco. Kantner, who had just finished another teleconference interview with a radio station, was ready and waiting for the call. After some preliminary introductions the questioning began. I have extracted a few of the questions and answers from the transcripts which were recorded.

Matt, who wants to be a rock musician, asked one of the first questions: "Having already put your mark on Rock & Roll were you pretty much guaranteed a record contract after forming KBC?"

Kantner responded in a quick informal manner:

No, not at all. I mean when you leave a band or you break-up...it is almost like starting over. In our case, some people thought this was just another dinosaur band or even a nostalgia band. We took the time to put a proper band together and we've written about two or three albums worth of material that will show up in the next few years if we stay together.

Tom, the disc jockey, with his bright stock of red hair asks Kantner about his favorite bands.

"How do you rate the new music?" Tom asked.

"I like a lot of it," said Kantner. "U2 is one of my favorite bands. I don't know if you consider that new music anymore. Also, Big Audio Dynamite and The Wooden Tops are two more that I really like. How about you guys, what who do you like?"

Tom responded, "How about Rush?"

"Rush? They are not a new band." said Kantner. "Rush has been around a long time."

"Since 1971," said Tom.

"That is ancient by Rock n' Roll standards. Not as ancient as yours truly but still ancient."

Leslie a relatively quiet person, who wants to be musician, asks Kantner about producing music at a live concert:

I read that you never wanted to play in a big arena. Why is it?

Well the stuff I do involves a lot of complex harmony and combinations and it is hard to get that across in a basketball arena. So it sort of limits the amount of people that you can play for. We play in a lot of places and we always try to find the the good ones where the sound is OK.

Some of the answers ran more to the philosophical edge, such as this one about performance:

> I would think that the best way to study performance is to perform. Even if you're terrible you just have to go through this process and [learn]... Most of the people making great success in the music business, not all but many, are people who just go out and throw caution to the wind and take a chance. If you fail you fail. It's not like you're going to die...It is a drastic thing to fail, but you have to learn to live through that.

Kantner was not without his own questions: "Tell me you guys what things are you afraid of? What are your aspirations? What do you want to do?"

As I sat with these students, in the same room where they had conducted their interview, the memory of their experience was still very much alive. The conversation moved quickly with each student expressing a measure of satisfaction beyond their words. "Kantner spoke to us about things that were important to us." "We would like to talk with another musician who has not made it big and compare the interviews." "It has made school really special for these few weeks. I still get excited when I think about it." "My friends asked me about my interview, even my parents asked."

From the students there was really only one note of concern which was about the lack of press coverage:

> I don't know why we didn't get more press. We were told that we would have reporters from Syracuse and Albany, but they didn't show up. Even our local paper hardly reported what happened. If this had been a local football game they would have given it two columns of reporting. We hardly got mentioned.

Leaving these students at Hancock Central High School I was sure that their story deserved attention. Like the football player who had thrown a touchdown pass these students had achieved something notable. Specifically they had organized their thoughts, written a research paper, developed a set of interview questions, and cooperated successfully while interviewing. These skills in themselves are notable. There is more, because these students learned something about the career interest to which they aspire. It was striking that virtually all the students had a clear purpose in their participation in the project. Finally these students had gained an experience which made them happy. This may be most evident in the fact that every student described school as a good place.

Thinking about the student's attitude, I realized that in part it was a product of the care and cooperation that allowed such an event to occur. Starting with the BOCES personnel and including the Hancock School District Superintendent, Dr. Urzillo, there was widespread support for the project. The support for the project is even more obvious in the willingness of the teachers and librarians who helped the students research and write their papers.

Betty Wasiluk and Warren Fredrick had organized a successful Electronic Field Trip. While the actual interview was a little like a familiar telephone conference call, the result was nothing like a casual conversation with a friend. The project became an Electronic Field Trip through the planning, organization, and effort of all the participants including the students and Paul Kantner.

ELECTRONIC FIELD TRIP:
ANALYSIS AND COMMENTARY

JUNE, 1987

In their simplest form Electronic Field Trips are very similar to planned teleconferences (group phone calls). These programs are one of several instructional services offered in the Delaware-Chenango BOCES[18] Tele-Learning Program.[19] While Electronic Field Trips offer students opportunities to meet and talk with interesting people, they require considerable planning and cooperation from a number of people and organizations in order to make them more than a casual telephone call.

Just how much work do these Electronic Field Trips require and what are the benefits of doing them? These are the questions teachers and other school officials ask as they consider this instructional strategy. Many teachers commented that their schedules were so tight that they could not imagine using such a strategy, especially when it is so unclear how it would contribute to classroom curricular objectives. Other teachers expressed concern about the time and effort necessary to plan such a program. These expressions help explain why after a year and a half, despite the concentrated efforts of BOCES personnel to facilitate these programs, there have only been eight Electronic Field Trips.[20]

The focus during this evaluation was on a single case study of an Electronic Field Trip for two reasons. First, it was the only one in operation at the time of the evaluation. Second, it was not obvious what the advantages and problems of such a program were and an analysis of a single case study would reveal those details. In order to gather information about the program extensive interviews were held with teachers, students, school administrators, secretaries and BOCES personnel about their experiences. Additionally information from BOCES documents, student papers and newspaper articles was included in the study. From this catalog, those concerns most strongly represented in the data were identified:

1) How much planning and cooperation were necessary for this program to succeed?
2) How did the students benefit from this project?
3) In what way did this project affect the school system itself?
4) Why did we need this equipment?
5) Why did this program work in the Hancock School District?
6) Would this program work in another district?

Once each of these issues is discussed, the paper will close with recommendations to teachers considering the use of such programs. Since the nature and organization of the Electronic Field Trip differs from the other audio-graphics programs this analysis follows a slightly different format.

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18 BOCES: Board of Cooperative Educational Services, a regional educational organization.

19 Currently the Delaware-Chenango BOCES is operating 4 Tele-Learning Programs: AP Calculus; AP English; Spanish 4; and Electronic Field Trips. Each of the projects is discussed in separate papers, and the interested reader should contact the BOCES for additional information.

20 It should be noted that during this spring '87 there have been several additional field trips

HOW MUCH PLANNING AND COOPERATION ARE NECESSARY?

In the case study which described the Electronic Field Trip with Paul Kantner, one of the emergent themes centered around issues of cooperation and planning necessary to schedule the activities of the different participating people and organizations. On this point, Fredrick, the teacher who organized the project notes:

> Just about everybody gave me their support. Betty was terrific, she did everything she could to help me. Dr. Urzillo was really enthusiastic. And the librarians at both the school and the BOCES were invaluable. Without them I would have really been in trouble. Also the secretaries, especially at the BOCES, were really helpful.[21]

While BOCES personnel and other teachers helped Warren Fredrick with the field trip the Superintendent of the Hancock school noted that, "The responsibility for the project rested on Warren Fredrick's shoulders. He did an excellent job preparing for it." This responsibility constituted a lot of work, which Fredrick recognized despite his enthusiastic support for the project, "I was surprised about how much organization the project took. It seemed like there was a lot of details to organize."

Organizing and scheduling were aspects of the planning. Another was developing an instructional program. Fredrick felt strongly about the importance of the educational nature of the experience:

> I wanted to make the program educational so I decided on a contest where the kids would have to write a research paper. I would choose the kids [for the conference] by the quality of their paper, effort and interest. The good thing about this idea was that it helped the kids prepare for the interview. I even had one kid tell me after the interview, 'Now I understand why we did those research papers'.

Electronic Field Trips are not simple programs to plan. They require considerable coordination among a number of different people and organizations. Further they require academic preparation in order to make them relevant and effective in achieving educational purposes. It appears that teachers are the appropriate coordinators for these programs but as Dr. Urzillo, Superintendent of schools at Hancock Central notes, "..the teachers are one potential weak link in these programs."

Electronic Field Trips can be thought of as a temporary alliance of actors with the teacher playing a pivotal role keeping that alliance together. If more teachers are to adopt this promising technique, then greater recognition of the demands this places on them and identification of ways of reducing the teacher's load are needed.

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21 All quotes should be attributed to personal interviews with students and school officials in the Delaware-Chenango BOCES during the time between April to June, 1987.

HOW DID THE STUDENTS BENEFIT FROM THE PROGRAM?

What are the benefits of such a program? The answers should be especially interesting since many teachers and administrators seemed dubious that an interview with an aging Rock & Roll star could be of any value whatsoever:

> I'm not demeaning him, Paul Kantner was very good, but I would rather see a psychology class talk with Bettelhiem. Or our music class talk with some great composer. I don't mean to criticize him, but I would like to see our English classes talk with some great author and our science classes talk with some great physicist.

Concerns about the Electronic Field Trip program were not only related to the perceived educational value of the person interviewed, many teachers interviewed expressed doubt about how such programs could be incorporated into their curricular plans. Indeed, when one considers the schedules of most teachers it seems reasonable for them to ask, "How will my students benefit from such a program?"

As noted above, Fredrick felt strongly about the educational nature of the experience, and academic skills are one potential benefit of such a program. Analysis of this case revealed four additional categories: role model, self esteem, cultural awareness, and career information. While it is not obvious that all future cases of Electronic Field Trips will benefit students similarly, this case demonstrates the potential of this educational strategy.

AN INTERESTING AND EXCITING RESPONDENT

For several of the students who are aspiring musicians, Paul Kantner served as an important role model. Kantner is obviously successful at his practice, but moreover, he is an attentive and compassionate adult who was important to the students:

> It was like he was really listening to us, and we were talking about things that were really important to us. Not just about music but about life, politics and the world. He is really a great guy. He really cares about people and that is why the field trip was so special to me.

In other cases, the person(s) on the "other end" of the line may not be role models in the sense that Kantner was, but some attraction is needed to motivate interest in the exchange between the students and respondent. Kantner was able to speak intimately to these students, an attribute that a more scholarly respondent may have found less easy.

SELF-ESTEEM

One of the accomplishments of this particular field trip was the way in which it made the students feel good about themselves and about school. Perhaps the mix of Paul Kantner and students was just right in this field trip, but what seems apparent is that an opportunity to meet someone through an electronic field trip can affect the students' self esteem:

> [The field trip] was important to me because he really made me feel like I was someone

special. I mean he was way off in San Francisco, but he took the time to talk with us, and when I asked him a question he really tried to answer it. It wasn't like he was just doing his job, he really would tell stories about himself. It really made me feel like I was somebody.

CULTURAL AWARENESS

Certainly these rural students are not as likely to be able to attend a large production play, a musical production, or art show as students in a larger metropolitan area, but then many of us miss these opportunities even when they are readily available. It is not clear how electronic field trips can act as substitutes for such cultural opportunities, but it is clear that these field trips offer students a unique opportunity to meet and talk with all different kinds of people. In this respect the successful Electronic Field Trip can offer students a means of becoming involved with the larger community of people and ideas that make up a country. It is a way of addressing the provincialism that resides in all of us, whether our home is in an urban or rural area.

CAREER INFORMATION

One of the more practical aspects of this particular field trip was that it provided the students additional information related to their career interests. This aspect of the field trips seems especially important because the students were making decisions about future educational plans based on their knowledge and expectations of a particular interest. The value of information gained by talking with someone working in the field is a meaningful adjunct to traditional sources of career counseling.

ACADEMIC SKILLS

One of the ironies of this project was that while several people commented on the questionable academic purpose of interviewing an aging Rock & Roll star, the students were actively involved with several sophisticated academic skills. Teachers, students and administrators alike described this as a successful project because students had done research, written a paper, conceived an interview format, and cooperated together to complete the project.

In the above analysis the notion of benefits has been expanded to include more than just academic skills. It is difficult, if not fruitless, to ask which was most important. Rather, what is apparent is that the Electronic Field Trip is a versatile educational strategy which offers a wide range of educational benefits. Further, it seems that by organizing such field trips around familiar academic skills such as research and writing, the advantage of the other benefits are not necessarily lost.

The Electronic Field Trip also had benefits for the school district itself. Three such benefits were: 1) the project extended educational opportunities directly to the students (an important point

for rural schools with limited curricular offerings), 2) the experience was a source of pride for the school officials (which could be reported to the community), 3) the program was able to include students who are not normally engaged in special school programs.

HOW GOOD WAS THE EQUIPMENT: INTERACTIVITY?

One proposed advantage of electronic field trips is its potential for interactivity among the participants. Without interactivity in such a project students are probably better off reading books, watching films, or listening to tapes. The claim in favor of interactivity is that it engages the student on levels of immediacy and relevance which include emotional and social aspects of the students' life as well as the intellectual. Generally, interactivity has been described as a technical function: the number of bits exchanged given a specific technology. The model for comparing these technologies is often the classroom itself, where teachers and students are able to see one another, talk with one another and "interact".

With this live classroom model in mind, technologies have been ranked as more or less interactive. Interactive television is thus seen as the most life-like of the telecommunication technologies. Interactive voice, via phone, is thought of as less interactive because there is no opportunity for students to see the speaker. Interactive voice with electronic blackboards (computers) fits somewhere in between, because of the additional information that can be exchanged.

This conception of interactivity as a question of how much information can be exchanged misses the important point about the meaning or quality of the information. It seems pointless to invest in the "bigger is better" philosophy if the addition only adds confusion. One need to be concerned about the noise/meaning ratio as one think about the significance of interactivity for telecommunications.

Further, it is misleading to think of interactivity as only something that happens during a teleconference, or between points. The Electronic Field trip at Hancock with Paul Kantner provided a fine example of the many kinds of interactivity between students, teacher and administrators. Additionally, one need to recognize that interactivity is not only a social exchange. Students in the Kantner Field Trip were actively involved with reading, writing, music, as well as with each other. Much of this interaction took place before and even after the actual teleconference. To the degree that students, teachers and administrators collaborate, how involved students get with added resource materials, or perhaps most importantly, the degree to which students become communicative about themselves, telecommunications can claim a high level of interactivity.

The Kantner Electronic Field Trip proved successful on all these counts. First, it got teachers and administrators together planning the conference. Then it got students involved with researching new materials. Additionally, students were excited about their adventure. Finally, students

conducted an interview where they learned about the larger community of ideas and people while communicating more about themselves. The Kantner Electronic Field Trip was a highly interactive conference not because of the technology but because of exchanges of people around planning, researching and communicating. It is not obvious that simply planning another teleconference with a rock star and putting a research paper in front of it will result in a highly interactive experience, rather teachers and administrators will have to invest time and energy planning such programs.

WHY DID THIS PROJECT WORK IN HANCOCK SCHOOL DISTRICT?

Interviews with teachers, students and administrators revealed several factors which suggest that Hancock Central School was ripe for curricular expansion. First, there was widespread recognition of the curricular limitations in the school district. Dr. Urzillo, the school Superintendent noted that these limited opportunities have caused problems especially because of the unusual circumstance that many of the students are from Pennsylvania:

> We have a small contingent that thinks that we cannot offer the quality of education that a larger school does. Some of that group, based in Pennsylvania, have in the past pulled their children from our school and sent them to the Waynes Highland School District in Bloomsdale, which is an excellent school district. But when we can offer a course like this, that group can see it is not so bad after all. So politically it is good too

In the last few years the school board has been very supportive of efforts to expand curricular programs. Dr. Urzillo noted several new programs which have been added to the curriculum at Hancock Central School District, two examples are the Alternative Education Program and the Early Admissions College Program through the SUNY Delhi College.

It seems evident that support for curricular expansion in this district was an important underlying factor in the success of this program. The Superintendent was anxious to expand programs: "One of the things that bothers me is that we have a number of students who are top notch students, but because of scheduling problems and financial problems we could not offer courses, such as advanced placement Calculus, which we are now doing through Tele-Learning." Further the BOCES administrators were very anxious to organize a field trip, in part because one had not been organized during that school year. One cannot ignore the importance of such enthusiastic support on Fredrick's decision to participate with the program. Less overt support may have dampened even the heartiest of teachers.

Another factor underlying the success of the program was the inclination of the teacher himself:

> I'm a teacher who is interested in these kinds of things. I was looking for a way to get kids involved with music. The kids are really interested in the high tech stuff and it seemed like a good way to get them involved.

Dr. Urzillo notes that Fredrick is a particularly innovative and flexible teacher, perhaps in part because of his position as a band teacher. Most of the teachers at Hancock Central High School teach four or five classes everyday. This schedule is often fixed and rigid, in contrast to Fredrick whose curriculum for Band is more flexible. As Dr. Urzillo's notes,speculating why Fredrick was willing to participate and other teachers were not:

> ...these teachers are really pushed...their kids have to pass the Regents exams. They have to do well on the PEP tests. I have a teacher who always has ninety-seven percent of his kids passing the Regents social science exam. This guy works on a tight day to day schedule. Does he want to take off two days to talk with someone about a frill? No, I don't think so. But if the field trip was [related to some] part of his classroom curriculum then I think you would get the teacher's cooperation.

Many observers of the project noted that one reason this Electronic Field Trip was so successful was that the subject matter was perfectly suited to the interests of a small number of students. But perhaps most importantly, the respondent - Kantner - was interested, and involved with the students during and before the interview.

WILL ELECTRONIC FIELD TRIPS WORK IN OTHER SCHOOL DISTRICTS?

It seems that in several ways the planners were lucky in this particular Electronic Field Trip: the topic was well suited to the interests of the students, staff and administrators were very supportive of the project, the person interviewed was both an interesting as well as compassionate person, and the teacher had the time and energy to invest in planning the project.

As one thinks about using this instructional strategy in other school districts these criteria should be met. Many Electronic Field Trips have been successfully planned and executed in the Delaware-Chenango BOCES, which suggests that these criteria are not unattainable. There remains, however, many teachers who are concerned about how Electronic Field Trips fit into their curricular plans. This question may be the most important one that both BOCES administrators and teachers need to address if the Electronic Field Trip program is to continue successfully into the future. Currently BOCES planners have organized the program to be responsive to all the varied interests of the teachers in the districts. This appears confusing since it requires each teacher to initiate and organize each field trip. Given these uncertainties about how Electronic Field Trips ought to be used within a specific classroom, and the evidence of considerable planning necessary to facilitate these programs, it is not surprising that teachers are unwilling to participate. Considering the workload under which most school teachers operate, BOCES personnel should construct a set of standardized and relevant Electronic Field Trips which would be easy and ready for use by a wide number of teachers.

One advantage to standardizing field trips is that teachers could scheduled the programs into their instructional plans. Standardizing field trips would relieve the teacher of the many organizational and instructional tasks which are currently necessary to develop a field trip. Further, standardized field trips could reassure prospective interviewees that their participation would not become a taxing commitment. Finally, standardizing the field trips would allow the BOCES to

identify specific people to be interviewed. Narrowing the field should help the Coordinator focus his/her efforts soliciting interested parties. Additionally, such an arrangement would allow specificity about the degree of participation expected of a participant, if s/he accepted the BOCES invitation.

The Electronic Field Trip at Hancock Central High School proved to be an exciting and beneficial experience. Future programs can be just as successful, but efforts should be made to reduce the teacher's workload. BOCES personnel can be helpful with this problem by assisting the teachers with decisions about appropriate topics and strategies for preparation.

CONCLUSION

The study of this Electronic Field Trip revealed that the program has great potential. But even in the case where the teacher worked with the very best of circumstances (supportive administration, interested students and cooperative interviewee), the task of organizing the program was great. In another school district where the circumstances are less ideal, it is reasonable to suppose that teachers will be reluctant to pursue such a course even if they believe in its value. One solution to this problem would have the BOCES personne invest more time developing a catalog of standardized programs instead of attempting to address the individual demands of teachers. Perhaps once the program is better established it can be expanded.

TELE-LEARNING:
THE SUMMARY DOCUMENT

JUNE, 1987

INTRODUCTION

During the 1986-7 school year, three advanced courses were offered via Tele-Learning (AP English, AP Calculus and Spanish III), as well as special projects known as Electronic Field Trips.[22] These programs were all remarkably successful and concluded, at year's end, with the enthusiastic support of participating students, teachers and administrators. The following report provides an overview of the findings and recommendations from formal evaluation of the above-mentioned Tele-Learning programs. After a summary review of the programs this section of the report turn attention to administrative issues which are described as possible friction points which might subvert an otherwise important means of providing rural youth with important educational opportunities.

TELE-LEARNING PROGRAMS

If once telecommunications was a futuristic technology, it is today as familiar as the satellite dishes in everyone's backyard. In education telecommunications allow one teacher to simultaneously teach students in more than one school. A simple form of such a system would be a teacher broadcasting a lesson over the radio to students within the listening area. One of the problems with radio instruction is that many educational opportunities are lost between the teacher and students who must sit passively and listen to a lecture.

Tele-Learning systems have become more interactive over the years, allowing teachers and students to carry on conversations like those in regular classrooms. Audio-visual systems, using television cameras so students can see to whom they are speaking, further enhance the interactive capabilities of telecommunications systems. Compared to some telecommunications systems audio-visual technologies are relatively complex and expensive, especially for resource poor school districts like those in rural environments.

Robert Taylor, Director of Instructional Support Services at the Delaware-Chenango BOCES, suggests audio-graphics is an alternative to the expensive audio-visual system, and in 1986 began a series of programs to test the capabilities of the technology. Audio-graphics uses a telephone based system which allows voice communication during a broadcast which is then enhanced with a computer network that exchanges graphics between broadcast points. This computer system is described as an "electronic blackboard" by the Optel company that developed the technology, and serves the same purpose as a conventional blackboard. While students at a distant school cannot see their teacher, they can see what is being written or drawn on the "blackboard" just as if they were in the classroom.

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22 Each of these four educational programs are discussed in detailed case study reports.

THE EVALUATION DESIGN

After a year of piloting Audio-graphic Tele-Learning programs the District Superintendent of the Delaware-Chenango BOCES, Dr. Freeman Van Wickler, asked for an evaluation of the programs. Since there were only four Tele-Learning programs in operation at the time of the evaluation, and they differed so substantially in organization and content, we decided to evaluate each as a case study. Within each case study we asked specific questions as criteria for judging the success of the programs. Once all four programs were evaluated, involving over thirty students in nine schools, our analysis turned to comparing the common themes and issues across all four programs.

Part of our purpose in conducting the evaluation was to inform the public about the nature of Audio-graphic Tele-Learning programs. Since the programs were pilots and not much was known about the operation of audio-graphics in the classroom we chose to focus our inquiry on the activities of students and teachers involved in the Tele-Learning programs. By choosing to focus our results in this manner we made clear our concern for the learning that takes place using these technologies. Our assumption being that people and not technology produce learning.

For each of the four programs we developed a story line giving the intended audience of BOCES officials, school administrators, teachers, students and parents a description of the organizational context in which a program operates, as well as the motivations and character of its participants. Thus a story helps make evaluation results accessible to readers, allowing them to consider their own circumstances as part of their judgment about the value of such a program.

For the purposes of our analysis of each case study, however, we identified three criteria for assessing the effectiveness or success of the programs:

1) The technology should be both reliable and functional.
2) The technology should not, at a minimum, interfere with the teacher's management of a classroom, their instruction of subject material, and the student's opportunity to learn.
3) The Tele-Learning programs should not interfere with the operation and maintenance of the school districts they involve.

Each of these questions raises different issues. For example, considering these program were pilots using technology untested in an educational setting, one might have expected technical 'follies' to have forced cancellation of the programs. This proved not to be the case. Indeed the audio-graphic equipment was remarkably dependable, with only minor complications.

It is possible that teaching Calculus, English or Spanish is not an easy task under any circumstances and that teaching these subjects when the classroom is divided between schools is impossibly difficult. Further, the subject material is sophisticated and requires students to work with nuances that might be difficult if not impossible to teach in a Tele-Learning environment. Observing these Tele-Learning classrooms, and interviewing teachers and students lead me to

conclude that such was not the case: teachers were able to teach and students learned. Indeed, as students and teachers became familiar with the audio-graphics technology they commented that the equipment "faded into the background". Gaining familiarity with the Tele-Learning environment was not easy, students and teachers struggled to manage a successful classroom.

Finally, one might have expected that the inter-district organization of cooperative programs would require an inordinate amount of administrative time to organize successfully. This proved not to be the case, although administrative issues did arise. For example, scheduling program activities was not always easy because each school district operates with different daily schedules as well as different vacation days. Other problems were related to the assignment of students to Tele-Learning programs. In some cases students were not well prepared. In other cases, the assignment of the "best" students to the Tele-Learning courses left teachers in the home school with the "rest" of the students.

The cases studied presented ample evidence that audio-graphics enabled teachers and students to organize important educational opportunities, but they also gained important social opportunities which were equally important. Mr. Foor-Pessin summaries these lessons eloquently:

> In the beginning you have to get used to the technology, but I think that's a minor issue, the bigger issue is you have kids coming from different backgrounds, different preparations and expectations about the work and their achievement. Despite all this, the students really learned. The papers they wrote got better as the year went on, and additionally they gained more information about themselves through their contact with one another in the program. Some of them learned that they are better students than they thought, while others have learned a measure of humility as they encounter students of comparable ability.

Students appeared to be aware of these opportunities and recognized them as worthwhile challenges:

> It's a challenge, because all of a sudden you've got people that you never even met before. They live in a different area, they have different ideas, they have had different teachers. It makes you stop and think about yourself. I think it also helps prepare you for college, because all of a sudden you're in this huge school, and you don't know anybody...my experience in this course has helped prepare me for that.

Despite the success of these programs school administrators, and other people, still questioned whether they should invest in interactive television instead of audio-graphic equipment. Such a question deserves comment, and hence the following note on technology and telecommunications.

A NOTE ON TECHNOLOGY AND TELECOMMUNICATIONS

Educators and students might choose interactive television over audio-graphics because of an assumed quality of communication between the broadcast points. This assumes that additional visual components to interactive Tele-Learning would add substantively to classroom learning.

However, the more complex technology may be less flexible (especially between more than two or three schools) and may be more difficult to use than the audio-graphics. Given both of these considerations, it is conceivable that televising Tele-Learning might do little to enhance learning while imposing higher costs and less flexibility.

Tele-Learning is often conceived of as a technical innovation and, in this respect, the notion of interactivity is often described in terms of the capability of the telecommunications equipment to exchange bits of information. Thus, a system that is able to carry visual information as well as voice and graphics would be more interactive then one carrying only voice. Focusing on the technical capabilities of telecommunications ignores, however, the important point about the meaning of an exchange: to wit a "live" classroom can be one of the least interactive environments known to mankind.

The focus of the above stories was purposively directed on student and teacher activities in the classroom. Thinking of interactivity in terms of the student's involvement with their subject material, or their involvement with other students and teachers, focuses attention on the effect of this technology on learning activities. The case study of the Electronic Field Trip is an excellent example of this point. Warren Fredrick, a music teacher at Hancock High School, using the simplest of telecommunication technologies - the telephone - organized a highly interactive program that involved students before the broadcast in research and in discussions and reflection after the broadcast. Thinking too narrowly about the potential of interactive technologies may lead one to miss the larger point that these technologies offer teachers instructional opportunities which, if developed properly, will result in successful learning for students.

It is not immediately clear how interactive television would offer a level of student involvement higher than that offered by audio graphics. The students in these four case studies were not troubled academically by the lack of visual contact, in fact the students and teachers appeared focused and involved with their Tele-Learning classes. Some students and teachers did expressed a desire for interactive television, but their reasons were often vague: "...because I want to see the people in the other class." On the other hand, teachers and students were able to clearly identify a lesson they learned using the audio-graphic system: "I have learned to speak my mind more clearly because I can't rely on people seeing me when I'm frustrated or confused."

This study did not attempt a comparative analysis between audio-graphics and audio-visual telecommunication networks, therefore it is not possible to make comparative judgments. These four very different programs reveal that audio graphics is a flexible teaching technology which works with a variety of teachers and students in a variety of different schools. Certainly interactive television would add another dimension to Tele-Learning, but it is not clear that such a dimension would substantially improve student-teacher interaction and hence learning.

SPECIAL CONCERNS ABOUT THE TELE-LEARNING PROJECT

As we thought about the concerns raised by the Tele-Learning Project, we assumed that the goal of program implementation was to have it operating from year to year without a tremendous amount of administrative maintenance. Currently the Delaware-Chenango BOCES Tele-Learning project includes only a few programs but according to Dr. Van Wickler, BOCES District Superintendent, the goal is to organize a considerably larger number of these programs. The success of such an ambition will not be easy and will rest, in part, on three issues: 1) that these opportunities result in positive educational experiences for students, 2) that the organization of these programs is administratively feasible, and 3) that the provision of these new opportunities does not negatively affect the opportunities for other students.

The case studies in this evaluation indicate that audio-graphics holds great potential for teachers and students to affect positively educational purposes. Indeed, given how differently each of the Tele-Learning programs was organized - each program differed in content, teaching style, student participation, and number of schools involved - it seems reasonable to conclude that the audio-graphics technology has a certain robustness, if you will, in its utility. There is danger in projecting the results of this evaluation to the circumstances of a much expanded set of programs. Currently it is relatively easy for teachers and BOCES staff to organize Tele-Learning programs but as the number increases the administration of them will undoubtedly become increasingly difficult.

Tele-Learning is essentially a cooperative effort among several school districts including students, teachers and school administrators. Administrative complications will eventually affect the good faith necessary to plan cooperative ventures, forcing school officials to rely on planning over which they have control. In the course of the evaluation several problems were identified which might interfere with the expansion of Tele-Learning programs. Each of these issues can be thought of as "friction points" which if ignored could drag the program to a halt.

A) Staff turnover:

Consider, for example, the retirement or sudden transfer of a valued Tele-Learning teacher. Assuming that students and teachers are concerned about the quality of Tele-Learning courses, a substitute teacher will not easily assuage concern. The loss of BOCES officials, who help support these programs with technical assistance, would similarly destabilize the delivery of these programs.

B) Student participation:

Planning cooperative programs may require school administrators to project, in the spring, student interest in fall programs. If students in one school change their mind about a course because of a conflict of interests (say the only time the course can be offered is during a free activity period) then it may not be feasible to offer the course for only a few students in the other school.

C) Selection of students for Tele-Learning courses:

The preparation of students who participated in these courses varied considerably. Many of the less prepared students expressed a belief that the exposure to AP courses was worthwhile. But such a position ignores the effect of their placement in the course on the pace of the teacher's lesson and consequently on the opportunities of the better-prepared students. If the criteria by which students are assigned to cooperative programs (especially AP courses) varies from school to school, student interest in such courses may diminish.

D) Scheduling:

Scheduling students and Tele-Learning courses may be one of the most difficult problems BOCES planners have to overcome. Each district has organized their daily schedules to satisfy their local requirements. With the few courses currently offered, these scheduling problems were manageable, but it is noteworthy that some students missed a portion of their other classes in order to participate in the Tele-Learning programs. Guidance counselors and teachers were willing to work with these conflicts to make sure these students received the benefit of an AP course. As the program expands, however, these problems are less likely to be easily resolved. The result may be that students express a strong desire and demand for Advanced Placement courses, but school officials are unable,or unwilling to schedule them.

E) Agreeing on standards of achievement

Inevitably a student in one school will challenge the grade s/he received from a teacher in another school. Such inter-district arrangements suggest that a regional policy be devised to address this issue, just as superintendents or principals now do within a district. Without a clear statement about academic standards students, teachers and school officials may all be operating differently, leading to confusion and dissatisfaction with the program.

CHOICES AND OPPORTUNITIES: UNEXPECTED CONSEQUENCES

When new opportunities are offered, such as those available through Tele-Learning, there is a tendency to focus on the expansion of choices made available to students or teachers. Rarely do we think how the expansion of new opportunities might act to limit choices and opportunities of other students or teachers. But the case of the Tele-Learning AP Calculus course illustrated that such unexpected outcomes can happen.

In small enrollment school districts, one can imagine that there are not many students enrolled in advanced math courses. Consequently, when students are taken from those programs and placed in the Tele-Learning AP Calculus course math teachers in the home schools lose some of their best students. The loss of these few students is significant and, according to some math teachers, can threaten the viability of a math program within the home school. The loss of students seemed especially bitter to some math teachers we interviewed because it was their professional judgement that the students were not prepared for an AP Calculus course nor was it appropriate for their development.

The point of this discussion is not to pick on the AP Calculus Tele-Learning program, which comparatively operated about as successfully as the other programs, but rather to illustrate that the assignment of students to one program can have unexpected consequences on another program. Further, there is the problem of assigning students who are not prepared for an AP Calculus course. Certainly these students gain exposure to advanced math concepts, which may be of some value to students in the future, but such an arrangement is at the expense of the better prepared students who must wait for the slower students:

> The course was tough, but I liked the challenge. Brian and I are kind of competitive so we kind of got into it. I'm not sure what some of the other kids at the other schools thought. Sometimes Mr. Jones would ask a question and there would just be dead silence. It made me so mad because I would get impatient...there were three other schools doing it and if they had a problem we had to wait for them to get their problem solved and it was just a lot of interruptions and a lot of wasted time.

Tele-Learning offers students as well as teachers new opportunities. The decisions of participants to pursue these opportunities will affect the opportunities of others. This will always be true because there are limited resources available within a school district (number of teachers, number of students, time during the day, classrooms and desks) and the expansion of new opportunities will require a measure of available resources at the expense of existing programs.

The delivery of educational services via telecommunication will provide students with new opportunities and one of the responsibilities school officials will have is seeing that the effects of those opportunities are fairly distributed to all students rather than just a few. Otherwise students, as well as teachers and school counselors, may regard Tele-Learning as more of an intrusion than an opportunity and this innovation as well as others will be lost because the complications simply did not outweigh the benefits for the participants.

RECOMMENDATIONS

The Tele-Learning programs studied in this evaluation worked remarkably well: the students learned, the teachers were able to teach, and the program did not overly complicate the school's administration functions. As in any technical endeavor, there were problems with the equipment - occasional breakdowns and glitches - but these interfered only slightly with the operation of the courses. Similarly, as with any human endeavor, not everyone was happy with the system, but none of the participants found the experience intolerable. Many of the participants expressed satisfaction with the program, along with their willingness to recommend Tele-Learning courses to their friends.

Our overall recommendations are as follows:

A) Continue to offer Tele-Learning AP courses and Electronic Field Trips.

The four Tele-Learning case studies provide clear evidence of the success of the project, which indicates that it ought to be continued. Indeed, we suggest that BOCES planners consider expanding offerings to include general interest courses like the astronomy program offered in 1986. Further, there is every reason to think that a wide range of students and teachers could successfully use this program. Recall, for example, how diverse the student groups were in both the story about the Electronic Field Trip and the AP English group. In both these cases the Tele-Learning program positively influenced student attitudes about themselves as well as their involvement in academics.

B) Establish a core of standard Tele-Learning courses and Electronic Field Trips, which remain organizationally and fiscally stable from year to year. In this way teachers and school administrators can plan for these opportunities with some assurance of their consistency and quality.

This recommendation is really a marketing device, to ensure that school district officials can rely on tried and tested Tele-Learning programs, thus reducing the risk of participation. Tele-Learning programs are currently implemented in response to student demand and teacher interest. While such an organizational arrangement allows for considerable flexibility it can also make it difficult for students and teachers to plan on course offerings from year to year. Further, it tends to ignore the fact that there are common core courses, such as advanced calculus or advanced English, in which a large number of students are likely to be interested. Pre-planning these courses will make arranging these "special programs" much easier.

C) Attempt to resolve some of the scheduling conflicts which are likely to create problems as Tele-Learning programs grow from a few courses and field trips to many.

Scheduling problems need to be considered both from the point of view of the school guidance counselor who organizes the school's master schedule, and the student who is interested in pursuing Tele-Learning courses. Short of standardizing school schedules for all districts in a BOCES, school officials need to consider the possibility of planning two or three pre-set Tele-Learning hours around which local school officials could plan. This way, guidance counselors could attempt to arrange classes so that there were fewer core course conflicts, and students could organize their schedules with the possibility of Tele-Learning courses in mind.

D) Develop a policy by which standards for student participation and student achievement can be more uniformly determined.

Clarifying expectations about student participation (academic expectations, requirements, etc.) for a Tele-Learning program would help students make thoughtful decisions about signing up for such courses. Teachers could plan their courses with some expectation about students' skill levels. Such predetermined agreements are likely to reduce the chances for confusion and argument in the future, hence maintaining Tele-Learning as a program in good standing.

CONCLUDING REMARKS

Tele-Learning has offered students important educational and social opportunities which would not have otherwise been available to them. These opportunities have made Tele-Learning an important part of their educational experience, and serves as a strong reason for continuing such programs. It is evident, however, that the continuation of the program is dependent upon coordinated decisions between all the participants (students, teachers and administrators). This cooperation requires that decision-makers operate with some degree of consensus and certainty. To the degree that BOCES planners can address and resolve some of the likely complications of such projects, then the scale will probably tip in favor of growth and success with the Tele-Learning Project. What should be finally clear, however, is that the problems facing these planners are not exclusively technical ones involving computer hardware (IBM), software (Optel) and phone lines , but rather social and organizational ones centering around scheduling, standards and staffing.

APPENDIX 1

ELECTRONIC FIELD TRIP : OUTLINE OF CONTENT ANALYSIS

1) COOPERATION AND PLANNING (These sections were divided by participants because we wanted to know how different individuals in the school system perceive the issue.)
- Warren Fredrick (the teacher who organized the field trip)
- Students
- Other teachers and school administrators
- Kantner's group
- BOCES personnel

2) BENEFITS FROM THE FIELD TRIP TO THE STUDENTS
- Role model
- Feel important
- Cultural awareness
- Career information
- Academic skills
- Use of computer equipment

3) BENEFITS FROM THE FIELD TRIP TO THE SCHOOL SYSTEM ITSELF
- Expanded curricular opportunities
- Good politics

4) THE QUESTION OF INTERACTIVITY
- The technical aspects
- Classroom examples
- Organizational examples

5) UNDERLYING REASONS FOR THE SUCCESS OF THE PROGRAM AT HANCOCK
- Propensity of the administrator as a problem solver
- Support of school board
- Recognized limited curricular opportunities
- Recent attempts to expand curricular offerings
- Teacher work with a flexible schedule
- Teacher was an innovative risk taker

6) WHY THIS PROGRAM MIGHT NOT WORK IN ANOTHER DISTRICT
- Teacher resistance
- Past disappointing experiences
- Administrative resistance to BOCES
- Problem of getting people to interview
- Lack of student interest or cooperation

TELE-LEARNING COURSES : OUTLINE OF CONTENT ANALYSIS

1) REASONS FOR PARTICIPATING IN THE PROGRAM
- Students
- Teachers
- School administrators

2) TECHNICAL ISSUES RELATED TO THE OPERATION OF THE TELE-LEARNING CLASSES
- Operation of equipment
- Quality of sound
- Effect on classroom dynamics

3) ACADEMIC BENEFITS AND PROBLEMS ASSOCIATED WITH THE TELE-LEARNING CLASSES
- Preparation for the course
- Quality of instruction
- Homework and tests
- Ability grouping of students
- Perceived value of opportunity

4) SOCIAL INTERACTION OF STUDENTS AND TEACHER WITH THE TELE-LEARNING CLASSES.
- Within class interaction
- Between class/school interaction
- Student/ teacher interaction
- Perceived benefits
- Perceived problems

5) SCHEDULING PROBLEMS ASSOCIATED WITH THE TELE-LEARNING CLASSES
- For school administrators
- For teachers
- For students

6) SELECTION OF STUDENTS FOR THE TELE-LEARNING CLASSES
- Administrative comments
- Student comments
- Significance of selection

7) PERCEPTION OF TEACHERS IN THE TELE-LEARNING CLASSES
- Administrative comments
- Student comments

8) SUMMATIVE COMMENTS ABOUT TELE-LEARNING
- Administrative comments
- Student comments
- Teacher comments

APPENDIX 2

INTRODUCTION TO CASE STUDIES[23]

During the 1985-86 school year the Delaware-Chenango BOCES began a pilot of a Tele-Learning Project, enabling a teacher to communicate interactively with students in other schools using telecommunications equipment (an IBM computer, a telephone and modem, Optel software and an electronic notepad). The project began with two courses: astronomy and AP calculus. Each of these courses was taught by a single teacher to students in different schools. Additionally, using this same equipment, the Delaware-Chenango BOCES instituted a special program where students make tele-conference calls to other students and adults around the world. These programs are called Electronic Field Trips.

The Tele-Learning Project was continued the following school year (1986-87), offering four programs: AP English, AP Calculus, Spanish III, and Electronic Field Trips. With the support of Cornell University's Department of Education, the Delaware-Chenango BOCES began an evaluation of the Tele-Learning Project in March of 1987. The funds for this evaluation were part of the original grant.

The format of the evaluation report is divided into three tiers: a story about each program; an analysis of each story; and a summative document which draws from these cases generalizations about the project as a whole (for more about this evaluation strategy, see Evaluation Rationale, pp. 6-11). The case studies were developed after extensive interviews and observations at each site and represent, as much as possible, the views and opinions of the participants (students, teachers, and administrators). Finally, each case study focuses on a specific issue associated with the Tele-Learning Programs:

1). AP English: With fifteen students divided between two schools, the teacher uses the Tele-Learning equipment to teach an AP English course. How do the students from these two schools deal with one another in class? Is the teacher able to teach literature using this system?

2). AP Calculus: The teacher simultaneously delivers a single lesson to students in four schools. The material is technical and challenging. Can a single teacher manage so many different locations at once?

3). Spanish III: The teacher has six students in his class and only one student in another school. Does Tele-Learning interfere with the learning of students in the "home" school? Are students able to learn a language via Tele-Learning?

4). Electronic Field Trip: One exemplary case study is developed with the questions: What is the potential of an Electronic Field Trip? What are the benefits of such a program? Can it be readily utilized by other teachers?

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23 To be included as an introduction for the case studies if circulated individually.